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A Selected and Annotated Survey of the Literature on

– TRANSPORTATION –

STATUS, STRUCTURE, CHARACTERISTICS, PROBLEMS, AND PROPOSED SOLUTIONS

for

THE GOVERNOR'S COMMITTEE FOR TRANSPORTATION

Commonwealth of Pennsylvania

Compiled by

Jacob Grauman, Walter Bethel, Carol Carr, Mary Doran and Steven Manch
The Franklin Institute Research Laboratories
Science Information Services

October 19, 1967

State Planning Board
AUG 2 5 1968

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S C I E N C E I N F O R M A T I O N S E R V I C E S

An Annotated Survey of the Literature on

- TRANSPORTATION -

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PREFACE

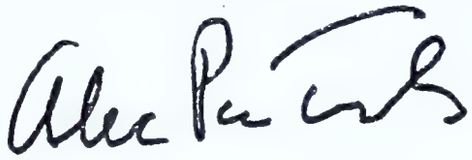
This annotated bibliography was compiled under the sponsorship of the Governor's Committee for Transportation of the Commonwealth of Pennsylvania which had been charged by Governor Raymond P. Shafer with the task of laying the foundations of a Department of Transportation for the state. The scope and purposes of our task were to provide information regarding the current and future status, trends, needs, etc., of all modes of transportation in Pennsylvania or which relate its position to other states, national trends, or other comparative guidelines.

Selection of the material presented here was influenced by its pertinence to a number of coordinate and subordinate objectives: The responsibility of the Governor's Committee to define the objectives, the administrative and legal structures and functions of such a department, and its relation to other departments and agencies at all governmental levels; the needs of the technical subcommittees and consultants retained by the Committee for (a) sources of information and methodologies in their own fields, and (b) to be alerted to information not in their own field but which could have a definite impact on their own work; the potential effects of new technologies on all existing modes; the growing importance of intermodal interactions; and both initial and continuing needs of the future Department of Transportation for similar types of information to be used as a basis for analysis, for design of efficient global planning, and for implementation of such planning.

All literature and information sources available were carefully studied for material considered relevant to the above described purposes. The results of this search are presented in the form of 614 abstracts, annotations, and citations.

The arrangement of the material is purely alphabetical, by author, and the accession numbers which are a combination of letter and sequential number represent the first letter in the author's name and his position within that letter: The bibliography thus serves as its own "author index". The subjects covered by the bibliography are referenced in the subject index.

In a work of this kind, the breadth of its scope and the limitations of time have inevitably resulted in less than complete coverage of information available in specific fields. The compilers will be grateful to those who call their attention to possible omissions in this compilation.



Alec Peters,
Manager, Science Information Services
The Franklin Institute Research Laboratories

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Ad Hoc Committee of Librarians.
SOURCES OF INFORMATION IN TRANSPORTATION. Compiled by Ruth Blaisdell et al. Northwestern University Press, Evanston, Illinois, 1964.

Ad Hoc Committee of Librarians for "Sources of Information in Transportation."
Sources of information in transportation. Compiled by Ruth F. Blaisdell [and others] Ad Hoc Committee of Librarians. [Evanston, Ill.] Published for the Transportation Center at Northwestern University by the Northwestern University Press [1964]
x, 262 p. 28 cm.
Z7164.T8A3 016.385 64-3045

A-002

Agle, C.K.
FROM HERE TO THERE: AN ANALYSIS AND PROPOSAL FOR TRANSIT. Traffic Quarterly, vol. 19, April 1965, pp. 240-6.

A new type of vehicle is proposed to provide high speed transportation, substantially door to door in a single system. The vehicle is a cross between self-propelled bus and subway car and is capable of independent operation or operation as part of a train. It will be capable of running on highways or rails with immediate transfer from one to another. The proposed system is described and advantages and disadvantages are discussed.

A-003

Air Transport Association of America
1967 AIR TRANSPORT FACTS AND FIGURES. Air Transport Association of America, Washington, D.C., 1967.

A-004

Allen, T.M.
FACTOR ANALYSIS OF ACCIDENT RECORDS. In: Highway Safety 1963 and 1964. Highway Research Record, no. 79. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 17-25.

Factor Analysis of Accident Records, T.M.ALLEN. Nat Research Council—Highway Research Board—Research Rec n 79 1965 p 17-25. Factors of good roads, weather, night, traffic conflict, rural, youth inexperience, weekend, and vehicle defect, were analyzed for their contribution to accidents; separate factor analysis was conducted on random sample of 1000 fatal accidents; linkage analysis was also supplied to data, primarily to group individuals into various classes.

A-005

Almond, J.
TRAFFIC ASSIGNMENT TO ROAD NETWORK. Traffic Engineering & Control, vol. 6, no. 10, Feb. 1965, pp. 616-17.

Traffic Assignment to Road Network, J.ALMOND. Traffic Eng. & Control v 6 n 10 Feb 1965 p 616-17, 622. Progress made by Road Research Laboratory, Great Britain, on methods of assigning traffic to network in which journey time along each link of network increases as flow on link increases is described; speed/flow and journey-time/flow relations were analyzed; it is stated that traffic assignments can be made by method described to networks in which journey time along each link is function of flow.

A-006

American Society of Mechanical Engineers
1966 NATIONAL TRANSPORTATION SYMPOSIUM. American Society of Mechanical Engineers, New York, N.Y., 1966.

A series of 54 papers organized under the following headings: Policies, general, future, and legislative; Planning and systems, resources, including education, training, manpower, research, and financing; technology of advanced vehicles and future power systems, including the commucar, undersea transportation, aircushion vehicles, new railroad freight vehicle equipment, the BARTD vehicle, the light weight gas turbine, interface craft, the space fuel cell power system, the turbine motor train, high speed transport in non-evacuated tubes, etc.; and operations, including traffic control, interface problems, and flow control.

A-007

American Trucking Associations, Inc.
AMERICAN TRUCKING TRENDS 1966. American Trucking Associations, Inc., Washington, D.C., 1967.

An annual report on the trucking industry which presents data on growth of truck use in the U.S. 1906-66; truck registration by state 1940-65; distribution of trucks by type of vehicle and use; freight transportation (including a comparison with various other freight transportation means); carrier size and location; motor freight tonnage; agricultural shipments; manpower; equipment; revenues; earnings; and costs.

A-008

American Trucking Associations, Inc.
GUIDE TO THE TRANSPORTATION OF EXPLOSIVES AND OTHER DANGEROUS ARTICLES, INCLUDING DRIVER'S GUIDE. American Trucking Associations, Inc. 1966. 44 pp.

This revised Manual provides a guide to the regulations covering the transportation of hazardous materials. Tables listing articles considered hazardous, the special requirements for their handling, the placarding necessary for both containers and the transporting vehicles are presented. A Driver's Guide, corrected up to the first of March 1967, is also provided. Together they cover the basic requirements for safe shipping of dangerous liquids and solids. Where the regulations are too long or too complicated to be condensed, the reader is directed to the appropriate sections of the Code.

A-009

American Trucking Associations, Inc.
SHIPPER"S CHOICE. Current Report no. 11. American Trucking Associations, Inc., Washington, D.C., 1966.

A-010

American Trucking Associations, Inc.
TRUCKING...MODERN BUSINESS BAROMETER. Current Report: Motor Transport Economics, no. 15. American Trucking Associations, Inc., Washington, D.C., March 1967.

In 1959, a new business barometer, the Weekly Truck Tonnage Report, published by ATA, was started. This weekly index is carried by the Wall Street Journal, the New York Times, Business Week, and others. This issue of Current Report discusses the several series of indexes of truck tonnage compiled by the ATA. Charts are presented including trends in intercity truck tonnage and rail carloadings as compared to the GNP for 1949-1965; a comparison of the quarterly, monthly, and weekly truck tonnage data on a per cent change basis from the fourth quarter of 1965 through the third quarter of 1966; a comparison of the seasonally adjusted monthly truck tonnage index and the Federal Reserve Board's index of industrial production.

A-011

American Trucking Associations, Inc.
URBAN TRUCKING. Current Report no. 12. American Trucking Associations, Inc., Washington, D.C., 1966.

A-012

American Trucking Associations, Inc.
WHAT'S WRONG - WHAT'S AHEAD - IN DOMESTIC CARRIER SERVICE. ATA Foundation, Inc. American Trucking Associations, Inc., Washington, D.C., 1966.

A summary report on present and future shipping requirements of two-hundred-and-fifty American corporations sponsored by the Clark Equipment Co.

A-013

American Trucking Associations, Inc.
WHO'S "IN" IN PIGGYBACK? Department of Research and Transport Economics. American Trucking Associations, Inc., Washington, D.C., 1967.

The growth rate of freight moved by piggyback is shown in relation to that of railroads and motor carriers. Five piggyback plans are listed and summarized in the table appended on the next page. The importance of piggyback to rails, motor carriers, freight forwarders, and water carriers is discussed. Piggyback operations by type of equipment (containers vs. trailers) is analyzed. Tables indicate the number of units by mode as reported to the ICC, the average short-line hauls per car, trailer, and ton by plan number, etc.

TABLE I
PIGGYBACK PLANS

Plan Number	Who Originates	Who Picks Up and Delivers	Who Supplies Equipment and Transfers To Rail Equipment
I	Motor Carrier	Motor Carrier	Motor Carrier, trailer; Rail, flatcar
II	Rail	Rail	Rail
II-1/2	Shipper or His Agent	Shipper and Receiver	Rail
III	Shipper or Freight Forwarder	Shipper or Freight Forwarder	Rail transfers and furnishes flatcar; Shipper or Freight Forwarder own or lease trailer
IV	Shipper or Freight Forwarder	Shipper or Freight Forwarder	Shipper or Freight Forwarder furnish trailer and flatcar
V	Motor Carrier or Rail	Motor Carrier or Rail	Motor Carrier or Rail

A-014

American Waterways Operators, Inc.
BIG LOAD AFLOAT; U.S. INLAND WATER TRANSPORTATION RESOURCES.
American Waterways Operators, Inc., Washington, D.C., 1965.

Following a review of water transport from a descriptive and economic viewpoint, barge service is analyzed and the history of water transportation is presented. Specifications and uses of individual towboats and barges are given. The personnel involved, the channels,locks and dams, ports and terminals, joint transportation benefits, and federal agencies involved are discussed. Specifications are given for important inland waterways of the U.S., together with their industries and principal commodities. The Ohio, Monongahela, Allegheny, and Delaware Rivers carry such commodities as: coal, petroleum, sand, gravel, industrial chemicals, iron and steel products, ores, wood pulp, etc.

A-015

American Waterways Operators, Inc.
1965 INLAND WATER-BORNE COMMERCE STATISTICS. American Waterways Operators, Inc., Washington, D.C., 1967.

An annual compilation of statistics on commodities transported over the inland waterways of the U.S. The lengths and depths of individual commercially navigable inland waterways including the Atlantic Coast Waterway, are given. The number and type of vehicles on inland waterways for the transportation of freight in comparison with previous years are provided; also the net tons and ton-miles including coastal traffic, and the principal commodities transported in net tons for 1965. Freight traffic from 1960-1964 are compared by various modes of transportation. The Allegheny, Delaware, Monongahela, Ohio, and other rivers are examined as to location, depth, total annual traffic, and principal commodities for 1965 in net tons. A map of commercially navigable waterways of the U.S. is included.

A-016

American Waterways Operators, Inc.
WATERSIDE SITE PLANT LOCATIONS AND EXPANSIONS 1966. American Waterways Operators, Inc., Washington, D.C., March 1967.

Private industry constructed, expanded, or announced plans to construct, a total of 530 plant facilities along or adjacent to navigable waterways in 1966. These are listed alphabetically by river. Pennsylvania's plant facilities include: an argon refinery for Union Carbide along the Allegheny River, a chemical plant for Gulf Oil Corp. at Philadelphia along the Delaware River, steel mills for the U.S. Steel Corp. and several other steel companies along the Monongahela River, etc.

A-017

Ames, ArDee.
THE ABC OF HIGHWAY AID OR HOW A LITTLE PROGRAM GREW BIG, STRONG AND CONTROVERSIAL. Nation's Cities, vol. 3, no. 5, May 1965. pp. 22-24.

Virtually 90% of the $46 billion Interstate Highway Program is complete, final completion being scheduled for 1972. The Commerce Department's Bureau of Public Roads presides over annual expenditures of nearly $4 billion for highway construction. In 1966 existing federal-aid programs included the Interstate System expenditures of $2.8 billion, the ABC system expenditures of $1 billion and $179 million for other programs (national forest, park, etc.). The apportionment of these funds is discussed. The Interstate Highway Program is matched on a 90-10 per cent basis, and the ABC program on a 50-50 matching basis. Provisions of the 1956 Highway Act are presented. Federal funds, while increasing, still fall short in relation to actual traffic use. In 1972 the cities will, according to the author, still be suffering from massive traffic congestion and financially starved public transportation.

A-018

Ames, ArDee.
A MARRIAGE OF LOVE OR CONVENIENCE? Nation's Cities, vol. 2, no. 8, Sept. 1964, pp. 10-11, 22-23.

Despite the 1962 Highway Act which specifies joint state- and local-planning, antagonism still exists between the highway engineer and the city planner. One problem is that federal money goes to the state highway departments, not to the cities. To improve the organization of the planning process, it is suggested that the organization be representative of the agencies and bodies responsible for plan implementation, with a nonpartisan viewpoint employed to resolve conflicts. Lack of community consensus on controlling major land uses, and lack of communication between the technician and policy-maker are impediments to intelligent highway building. The author suggests developing a generally accepted rating scale that would convert both highway dollar costs and intangible community values to a point system so that alternative highway locations could be compared systematically.

A-019

Anon.
AID FOR TRANSIT: A NATIONAL PROGRAM.
Nation's Cities, vol. 2, no. 8, Sept. 1964.
pp. 10-11, 22.

A report of the contents of the Urban Mass Transportation Act of 1964 together with some of its legislative history and the efforts of the American Municipal Association to secure its passage. Matching grants will be made to governmental units that have comprehensive plans and an economically feasible proposal.

A-020

Anon.
AIR-CUSHION VEHICLES TRY SHUTTLING PASSENGERS BETWEEN BAY-AREA AIRPORTS. Machine Design, vol. 37, Sept. 2, 1965, p. 12.

The nation's first scheduled passenger service using air-cushion vehicles started operation in the last summer of 1965. In its day-to-day role, it will speed airline travelers and other passengers across San Francisco Bay; round trips include metropolitan Oakland International Airport, and downtown San Francisco. In the long run it will determine the economic feasibility and passenger acceptance of air cushion vehicles for mass-transit.

A-021

Anon.
AIRPORT ACCESS HELD COMMUNITY PROBLEM. Aviation Week, vol. 84, May 30, 1966, p. 45.

The Federal government is firmly maintaining the position that congestion problems on roadways to and around airports belong to the communities involved, and that government participation toward correction will be limited to offering aid funds for research and development of modernized transit systems.

A-022

Anon.
AIRPORTS AND THE NEW JETS. Nation's Cities, vol. 4, no. 4, April 1966. pp. 24-26.

The development of smaller jets (such as the British BAC-111, the Boeing 727 and 737, and the Douglas DC-9) that can land on shorter runways and can operate economically on runs of 100-300 miles makes it possible for medium-sized cities to enter the jet age. They may not, however, because it will take $2 billion by 1970 to improve their existing airport facilities. The $2 billion would come from the states and communities ($1.3 billion) and $150 million annually in federal grants. But the latter may not be available: the current aid-to-airport program of $75 million per year is reduced to $50 million in fiscal 1967 (largely due to huge increases in military spending) and Congress wants the present program terminated in three years. The Air Transportation Association has stated that smaller city airports have not kept pace with larger city airports in schedule reliability chiefly because they do not generate enough business to be eligible for federal funds to allow them to install improved electronic and visual aids needed to promote all-weather flying and thus improve reliability.

A-023

Anon.
AIR TAXIS, COMMUTERS FACE NEW RULES. Aviation Week, vol. 86, no. 16, April 17, 1967, p. 43.

The proposed regulations modify the present ones in four areas: new flight requirements would specify that multi-engine aircraft should be able to sustain a failure of the most critical engine at any time after takeoff without hazardous results. Turboprops would be required to demonstrate static longitudinal stability; takeoff field length would become an operating limitation; minimum flight crew requirements would be based on pilot workload, location and accessibility of the controls and command decisions; airframe requirements would be changed; powerplant regulations would be changed; subsystems and equipment required will include oxygen systems for pressurized aircraft operating between 15,000 and 25,000 ft.

A-024

Anon.

ANNUAL BUSINESS AIRCRAFT OPERATING COSTS; DOUGLAS DC-3.
Aviation Week, vol. 86, Jan. 2, 1967, pp. 82-83.

A table based on data gathered in response to questionnaire issued by the Technical Committee of the National Business Aircraft Association. Figures are given for the latest available 12-month period (mostly calendar 1964 or 1965). The operator and the number of aircraft operated are given together with the variable expenses, normal fixed expenses, and additional fixed expenses. In addition the total hours flown, nautical miles flown and cost per nautical mile are given. This is one report in a continuing series dealing with various types of business aircraft.

A-025

Anon.

ARRIVAL AND DEPARTURE, CHANGES IN TRANSPORTATION .
Mechanical Engineering, vol. 88, Sept. 1966, p. 76.

Major changes in transportation envisaged in the next 15 years include high-speed trains, short-haul aircraft, and hydrofoil boats, which are alternatives to the increasing automobile congestion. The High-Speed Ground Transportation Act, concentrating on the Northeast Corridor, includes a study of all existing and some undeveloped modes of transportation to provide improved transportation between large cities. In one proposal, trains would be propelled through underground tubes by evacuating the air in the tunnel in front of the train and admitting air behind it, with a cruising speed of more than 500 mph. Short-haul intercity passenger trains are disappearing in favor of buses. Monorails have not demonstrated any advantages over conventional systems. Transportation of cars on multilevel autocarrier high-speed trains has been proposed. Increasing air traffic suggested the use of V/STOL aircraft, although its present weight is economically disadvantageous. Larger and faster jets are already underway. It is forecast that the passenger liner will virtually disappear with the development of 50-mph passenger hydrofoil ships.

A-026

Anon.
BUDD HIGH-SPEED TRAIN. Product Engineering, vol. 36, no. 15, July 19, 1965. p. 59.

Budd Company has engineered passenger trains capable of attaining speeds of 160 mph for distances up to 500 miles. Made up of as many as 10 self-contained and individually powered cars, customer railroads will have options of either electric motors or aircraft turbines. The turbine has the advantages of less vibration, quietness, and nontoxic exhaust. The cars will hold from 235 to 250 passengers and borrow many ideas from airplanes. If used on such heavily populated corridors as Boston to Washington, Philadelphia to Pittsburgh, railroads will have to make substantial improvements to their roadbeds, running into millions of dollars. These high-speed trains will require welded rails instead of those now in use and the roadbed will have to be very smooth.

A-027

Anon.
BUREAU OF PUBLIC ROADS ANNOUNCES TRAFFIC ENGINEERING PROGRAM FOR CITIES. Traffic Engineering, vol. 37, March 1967, p. 53.

A-028

Anon.
CLEVELAND SETS A U.S. FIRST AS RAPID TRANSIT LINKS CITY TO AIRPORT. Engineering News, vol. 177, no. 20, Nov. 17, 1966, p. 75.

Cleveland, Ohio will be the first city in the United States, and the fourth in the world, to provide direct rail transit service between the heart of the city and its major airport. After a 15 minutes train ride to the station, riders transfer to a bus to reach the airport. The $14 million extension will consist of two tracks running above ground parallel to the New York Central Railroad.

A-029

Anon.

COMING TO GRIPS WITH NEW HIGHWAYS; FIRMER LAND USE CONTROLS, [illegible] TRANSPORTATION PLANNING, WILL CHANNEL THEIR COMMUNITY IMPACT. Nation's Cities, vol. 2, no. 1, Jan. Feb. 1964. pp. 19-21.

The economic impact of the Interstate Highway System's 41,000 miles of limited access highways is not yet completely felt. Near Spartanburg, S.C., for example, I-26 and I-85 intersect and within the city limits construction permits are up 250% and 25 new industries have located in the adjacent county. Downtown shopping districts may not suffer from highway bypasses. Shopping centers may have been built too soon and too close together. The kind of highway has much to do with its impact: a limited access highway is more apt to result in intensive land use (high-rise apartments, regional shopping centers, industrial parks) than is a free-access road (which is apt to become a neon jungle). The problem is what land use follows the highway. Urban areas must create plans and this requires cooperation between state and local officials. The basic ingredients of transportation plans are listed.

A-030

Anon.

DEPARTMENT OVERHAUL SPARKS ROAD PROGRAM STEP-UP. Roads and Streets, vol. 106, March 1963. pp. 74-5.

The Indiana State Highway Commission was, until January 1, 1961, composed of three members appointed by the governor: two members of the in party and one of the out. Beginning in 1961 the commission was organized along bipartisan lines. There are now four part-time members (two from each party) and a full-time executive director. Among the advantages that have accrued are: road construction programs are being set five years in advance and may stay fixed regardless of the election returns; land acquisition can be initiated far enough in advance to ensure orderly progress; organization and mangement have been reorganized. Accounting procedures have been studied and a machine system installed.

A-031

Anon.

EASTERN SEES 50 PER CENT CARGO BOOST WITH 727QCs, NEW FACILITIES. Aviation Week, vol. 86, no. 9, Feb. 27, 1967. p. 37.

By investing nearly $100 million in 16 Boeing 727QC transports and ground facilities Eastern Airlines expects to boost its air-cargo volume by 50%. The first seven transports were delivered in February. The aircraft can be converted from passenger to cargo within 30 minutes with the aid of nearly $1 million of mechanical equipment.

A-032

Anon.
ECONOMIC GAINS FORECAST FOR SST. Aviation Week, vol. 86, May 22, 1967, pp. 26-27.

Balance of payments impact of the supersonic transport program is expected to bring $17-32 billion into the U.S. economy between 1975 and 1990. Sonic boom restraints pose one of the most serious problems. Breakeven level for the government's investment in the craft would be reached at the 300th aircraft with a rate of return of 10% if 1,200 are built. Passenger appeal would permit a fare differential of 10-24% above subsonic jets. FAA economists believe that the supersonic transport will operate with a higher load factor than subsonic jets. Operating costs are compared between the two. The SST is superior to all subsonic aircraft on a passenger cost basis. The introduction of the U.S. supersonic transport in 1974-75 will not require major changes in present airports.

A-033

Anon.
EQUIPMENT IN PROGRESS FOR HIGH-SPEED GROUND TRANSPORTATION PROGRAM. Westinghouse Engineering, vol. 26, September 1966. p. 145.

Self-propelled railway passenger cars capable of speeds of 160 miles an hour are being built by the Budd Company for the Pennsylvania Railroad. They are expected to operate between New York City and Washington, D.C. in Fall, 1967.

A-034

Anon.
FACTORS IN PLANNING HELIPORTS. Public Works, vol. 97, May 1966, p. 72+.

A-035

Anon.

FARE STRUCTURE STUDY READY; PRELIMINARY CAB FINDINGS DUE. Aviation Week, vol. 86, no. 15, April 10, 1967, pp. 37-38.

The fare-structure study was requested by the Civil Aeronautics Board and paid for by the airlines. In eight volumes, it consists of a sample covering more than 1,700 more important high, medium, and low density city-pair markets out of the thousands existing in the domestic U. S. Fares, mileages, and fares per mile are compiled for eight basic classes of fare. Using statistical techniques a formula was developed for computing an industry average fare for each fare class and market. Actual fare deviations from this were then calculated in terms of dollars, cents per mile and percentages. The implications of this study are commented upon.

A-036

Anon.

FORD'S EXPERIMENTAL GAS TURBINE SUPERHIGHWAY TRUCK. Engineer, vol. 218, no. 5675, Oct. 30, 1964, pp. 744-5.

Ford's Experimental Gas Turbine Superhighway Truck. Gas Turbine v 5 n 6 Nov-Dec 1964 p 34-6; see also Engineer v 218 n 5675 Oct 30 1964 p 744-5; Engineering, v [illegible] Prototype Ford [illegible] powered truck to [illegible] over superhighways is described; weight saving [illegible] adds 2000 lb to payload; [illegible] relation per [illegible] power take-off are considered.

A-037

Anon.
GROUND TRANSPORT PICKS UP SPEED. Engineering News Record, vol. 175, no. 24, Dec. 9, 1965. pp. 29-30.

A report prepared by the Massachusetts Institute of Technology for the Department of Commerce under the Northeast Corridor Transportation Project outlined four possible high-speed systems: a guideway on grade would be the least expensive and would be similar to a modern highway, possibly enclosed, and with some provision for automatic control of vehicles, but settlement and expansion and contraction owing to moisture and temperature changes would make alignment difficult to maintain within the close tolerances necessary at the speeds (200-300 mph) contemplated; an elevated guideway, more expensive, supported on piers 100 to 500 feet apart, would suffer from the same settling and temperature effects as the guideway at grade; a bored tunnel about 100 ft. down, which would be expensive although right-of-way would be no problem, but foundations would be a problem in metropolitan areas; a deep rock tunnel 500 feet down would be most expensive but would offer flexible routing and would not be vulnerable to temperature or earth movement (except earthquakes). A suitable vehicle would be a significant factor in selecting the kind of guideway. Various possibilities mentioned include units on rubber or steel or on an air cushion propelled by gas turbine engines or linear induction motors or forced through a tube. The layout could be a straight line with few stops or a network with an express line and local loops with transfers possible between moving vehicles.

A-038

Anon.
HELP COMING FOR MAIN STREET. Nation's Cities, vol. 5, no. 5, May 1967. pp. 7-9.

TOPICS (Traffic Operation Program to Increase Capacity and Safety) is a federally financed program for the improvement of traffic flow on certain streets (in towns of over 5000) not eligible for construction or reconstruction. 50% of the cost of studies will be supplied to local or state agencies. Types of improvements eligible for such aid: channelization of intersections; providing additional traffic lanes on approaches to signalized intersections; construction of pedestrian grade seperations or highway grade separations to relieve a bottleneck along a street of adequate width; installation of control systems to make traffic signals responsive to traffic or, for example, to establish part-time one-way operations; improving highway lighting, traffic control signals, or any device for better safety or movement; development of separate lanes for passenger transfer at surface transit terminals with appropriate platforms or shelters within the street right-of-way; development of truck loading or unloading facilities where necessary to facilitate traffic. All proposals should be possible within the present right-of-way. Canton, Ohio and Stamford, Conn. have received grants from TOPICS.

A-039

Anon.
HIGH-POWER SWISS TWIN-CAR SETS. Ry. Gaz., vol. 121, no. 3, Feb. 5, 1965, pp. 105-6.

High-Power Swiss Twin-Car Sets. Ry Gaz v 121 n 3 Feb 5 1965 p 105-6. Single-phase four-motor electric trailer of [illegible] to Berner Alpenbahn group of [illegible] in Switzerland; trains are composed of [illegible] with two inner axles of each car driven, so that four traction motors are installed; new detail is installation of [illegible] to be used at one end of push-and-pull train, composed otherwise of trailers and at far end control trailer; control permits multiple-unit coupling.

A-040

Anon.
HIGHWAY OUTLOOK STORMY AS COSTS RISE. Engineering News Record, vol. 176, no. 17, April 28, 1966, p.21.

The interstate highway program will probably cost $4.15 billion more than the 1965 estimate of $46.8 billion. Highway beautification will cost $1.6 billion on the interstate system alone between 1966 and the proposed completion date of February 28, 1973. No estimate has been made of the cost of beautification on primary and secondary roads. It is estimated that if 1966 trends continue, by the end of 1972 material costs will be 5.3% above 1956 levels, equipment costs will be up 31.4%, and average wage rates will be up 73%.

A-041

Anon.
HOVERCRAFT: A SPECIAL REPORT. Marine Engineering/Log, vol. 71, Sept. 1966, pp. 61-68.

About September 1967 a 160 ton passenger/car ferry air cushion vehicle, the SR.N4 hovercraft, with a capacity of 250 seated passengers and 32 autos and a speed up to 70 knots will pose the first major threat to conventional ship ferries across the English Channel. By 1985 there will be an estimated fleet of 16 N4s. Investment and operating statistics are presented. A directory of U.K. firms and organizations in the ACV industry is provided. The production of SR.N3s, N4s, N5s, N6s, and other models is described. The four countries, other than the U.K. and the U.S. known to be developing ACVs are Russia, France, Japan and Israel. There is a tendency for ACVs to yaw at low speeds and to capsize during high-speed turns in calm water. ACV terminals are discussed.

A-042

Anon.
INCREASES IN AIRLINE OPERATING REVENUES, 1966 OVER 1965. Aviation Week, vol. 86, no. 19, May 8, 1967, p. 48.

A table listing the passenger revenues, total operating revenues, and net profit or loss for 1965 and 1966, together with increases or decreases between the two years. The airlines are grouped by service: domestic trunk lines, international lines, local service lines, Alaska and Hawaii, and helicopters. Total operating revenue is given for all cargo lines. Additional balance-sheet and profit or loss information is also available in this and other issues.

A-043

Anon.
IN EUROPE YOU CAN TAKE IT WITH YOU. Railway Age, vol. 162, no. 10, March 13, 1967, pp. 24-26.

Carrying private automobiles by rail has become big business for Europe's railroads. Motorists drive their cars onto a car carrier, retire to the passenger cars and arrive, fresh and unharried, at their destination in the morning, having avoided hundreds of miles of congested traffic. The equipment used is the same as that used to deliver new cars from factories. The car carrier service is tied into the cross-Channel ferry service. In Europe the car carrier service takes motorists through the Alps, avoiding the delays caused by weather. The service through the Gotthard Tunnel has been so successful that a second tunnel is contemplated.

A-044

Anon.
JET SKIMMER SERVICE; AIR-CUSHIONED VEHICLES PLY SAN FRANCISCO BAY AREA. Compressed Air Magazine, vol. 71, May 1966, pp. 12-13.

The Bell SK-5 Jet Skimmer is the first hovercraft to provide scheduled passenger service in the U.S. Two vehicles have been leased to Port of Oakland and will be operated by San Francisco-Oakland Airlines. The SK-5 is an American version of the English SR-N5 developed by Westland Aircraft Limited. The hovercraft generates and rides on a cushion of air that sufficiently reduces surface friction so that a small amount of thrust can move it along at high speeds. The craft is described in technical terms.

A-045

Anon.

MCMORRAN HEADS NEW YORK DOT. Engineering News-Record, Sept. 7, 1967, p. 46.

J. Burch McMorran, Supt. of Public Works for New York since 1958, became head of that state's new Department of Transportation. The new department will administer the nation's largest state highway program.

A-046

Anon.

MODERN PASSENGER TRANSPORTATION DIRECTORY. Kenfield-Davis Publishing Co., Chicago, Ill., n.d.

A-047

Anon.

MULTI-LEVEL CAR PARKING ON ARCHES; EXPERIMENT WITH RAMP STRUCTURE IN BIRMINGHAM. The Surveyor and Municipal Engineer, vol. 123, no. 3751, April 25, 1964, p. 27, 62.

An English firm (John Lysaght's Bristol Works, Ltd.) has designed, fabricated, and erected the structural steel of a car park in a design employing arch ramps each containing a self-contained parking system. The first such (demountable) installation was opened in Birmingham, England.

A-048

Anon.

THE NEW GENERATION OF SHORT-HAUL JETS. Engineering, vol. 199, no. 5162, Mar. 26, 1965, p. 396-7.

New Generation of Short-Haul Jets. Engineering v 199 n 5162 Mar 26 1965 p 396-7. For purposes of article, short haul jet is defined as applying to aircraft using pure jet propulsion, intended for economic passenger carrying over stages up to 500 to 600 mi, with loaded weight in excess of 35,000 lb; information is given on British Aircraft Corp One-Eleven, Douglas DC-9, Dassault Mystère 30, Boeing 737, Fokker F-28 Fellowship, with notes on possible Anglo-French cooperation on large capacity, subsonic transport.

A-049

Anon.
NEW PIPELINE TO SUPPLY DELAWARE VALLEY WITH TONNAGE AMOUNTS OF NITROGEN AND OXYGEN. Chemical & Engineering News, vol. 39, Aug. 21, 1961, p. 23.

A description of a new pipeline to carry nitrogen, oxygen and possibly other chemicals to various locations, chiefly in the New Jersey and Delaware sections of Delaware Valley.

A-050

Anon.
NEW YORK STATE SAFETY CAR MAKES ITS DEBUT. SAE Journal, vol. 75, no. 3, March 1967,pp. 36-47.

In June 1965, the New York State Legislature passed a bill authorizing the development of a prototype safety car. Since the law specified that the conduct of the study should be free from the limits imposed by traditional design, manufacture, styling, testing and sales practice, a new approach was needed. That approach was to use the systems engineering techniques developed by the aerospace industry. These articles present the engineering and economic features of the prototype car. It is felt that the design would reduce the fatalities approximately 50 percent at a cost comparable to the price range of the current low-priced full-sized cars. Copies of the "Feasibility Study of New York State Safety Car Program--Final Report" may be obtained from William S. Hults, Commissioner, Department of Motor Vehicles, State of New York, Albany, New York.

A-051

Anon.
NO FEDERAL SUBSIDY DESIRED FOR PORT OF PHILADELPHIA SAYS AREA CHAMBER LEADER. Traffic World, vol. 121, no. 11, March 13, 1965, p. 24.

Frederick A Potts, president of the Chamber of Commerce of Greater Philadelphia has asked Senator Clark to refrain from seeking federal aid for the Port of Philadelphia since such aid also would have to become available to competing ports which are already ahead of Philadelphia. Distributed on a formula basis and spread thin, it would minimize the chances of helping the Port of Philadelphia materially.

A-052

Anon.
PENNSYLVANIA RAILROAD MERGER PLANS INCLUDE BUCKEYE PIPE LINE CO. Oil and Gas Journal, vol. 62, Feb. 17, 1964, pp. 82-3.

The Buckeye Pipeline, once a part of the Standard Oil system, is a 7,500 mile crude and products system stretching from Pennsylvania, New York, New Jersey westward into the midwest. A map shows the crude oil lines, product lines, and the product lines jointly owned. The Pennsylvania Railroad will issue 700,000 shares of a new preferred stock with a par value of $70 million to acquire the outstanding stock of Buckeye as part of its diversification program to improve its competitive position.

A-053

Anon.
PEOPLE PODS MAY SERVE AIRPORTS. Engineering News Record, vol. 176, May 5, 1966, p. 19.

Los Angeles has received over $490,000 in federal funds for a $735,000 study of a mass transit system that may use helicopters with detachable pods to move travelers between the city and its present and future airports. The grant, awarded by the Dept. of Housing and Urban Development, is the first under the Urban Mass Transportation Act of 1964 for study of a system idea involving aircraft. The act permits federal financing of up to two-thirds the cost of such studies.

A-054

Anon.
PIPELINERS BUILT 21,342 MILES IN 1965. Petroleum Management, vol. 38, February 1966, p. 80.

A-055

Anon.
PITTSBURGH UNVEILS HUGE RENEWAL PLAN AND AN OVAL AIRPORT TERMINAL. Engineering News, vol. 176, no. 19, May 12, 1966, p. 22.

The Pennsylvania Railroad's 148-acre, 40-block development plan for downtown Pittsburgh is described, together with the Trans-World Airlines plan for a new airport to be constructed by TWA.

A-056

Anon.
POLICY AND STANDARDS FOR ENTRANCES TO STATE HIGHWAYS. Public Works, vol. 97, Dec. 1966, pp. 68-70.

A-057

Anon.
THE POTENTIAL OF COORDINATION AMONG THE FEDERAL AGENCIES REGULATING TRANSPORTATION. ICC Practitioner's Journal, vol. 33, Sept. 1965, pp. 872-94.

A-058

Anon.
PUBLIC TRANSPORT AT TURN OF KEY. Engineering, vol. 198, no. 5145, Nov. 27, 1964, p. 684.

Public Transport at Turn of Key. Engineering v 198 n 5145 Nov 27 1964 p 684. Research project undertaken in Geneva by Battelle Memorial Institute considers compact, silent, low performance, electrically driven car that can turn almost in its own length and emits no toxic fumes, for easing city traffic congestion; car might be owned by individuals, but is conceived more as self-service taxi, possibly for municipal operation; proposal for personal key system and metering arrangement is explained; work being done in Geneva and Frankfurt on fuel cell to replace battery is also noted.

A-059

Anon.
RAIL/BUS EVALUATION CONTINUES. Aviation Week, vol. 87, no. 9, August 28, 1967, p. 57.

Two New York agencies are continuing evaluation of a rail-bus vehicle intended to decrease travel time between Manhattan's East Side Airlines Terminal and Kennedy International Airport. The prototype is a standard General Motors airport-type bus equipped with retractable rail wheels, enabling it to operate on standard railroad tracks as well as on highways.

A-060

Anon.

RAPID TRANSIT BUILDS AN ALLIANCE. Engineering News Record, vol. 176, no. 6, February 10, 1966. pp. 51-52.

A report on the First International Conference on Urban Transportation held in Pittsburgh, Pennsylvania. The most important problems considered by the speakers were political and economic, and more intergovernmental cooperation was called for. The achievements of Pennsylvania in the areas of urban transit and highways were mentioned. Financing, including Federal aid to modes other than highways was considered, and balanced transportation planning was called for. Rail systems were the favored means of ground transportation. The conference was seen as dedicated to exploring new ground rules rather than evolving definitive solutions. Some of the immediate results, it was noted, were the establishment of the Transportation Research Institute at Carnegie and the drawing of attention to Pittsburgh's capabilities in the field of transportation-equipment manufacture. (See also P-024)

A-061

Anon.

RAPID TRANSIT SERVICE FOR METROPOLITAN AREAS. Engineer, vol. 215, January 11, 1963. pp. 116-18.

A description, in a British publication, of Westinghouse's automated system which proposes the use of a twenty-passenger vehicle, travelling at speeds up to 50 m.p.h. on a trespass-free, aerial closed-loop expressway. The electrically driven trains would operate in trains of from one to ten units depending upon traffic density. 5,000 to 14,000 riders per hour could be handled. Trains would be automatically dispatched and computer controlled so that the maximum waiting time would be two minutes during 24-hour service. Fare collection and change making will be automated. Financing as well as engineering characteristics are discussed.

A-062

Anon.

ROADBUILDERS TAME TENNESSEE MOUNTAINS. Engineering News, vol. 176, no. 20, May 19, 1966, pp. 50-51; 54-55.

A description of the difficulties encountered in building certain sections of I-75 (which will run from Tampa to Sault Ste. Marie) in Tennessee. Isolation has been a problem and all the contractors have had to build access roads. One contractor spent two months building a 4-mile access road to his 6-mile project. Much of the rock is rotten, there have been overruns in quantities, sections have to be quickly redesigned when it is impossible or impractical to hold a line or slope. Problems of the four contractors and their solutions are described in some detail.

A-063

Anon.
RUBBER-TIRED TRANSIT TRAINS PROPOSED: WESTINGHOUSE ELECTRIC CORP. Eng. N, vol. 169, Dec. 13, 1962, p. 22.

Westinghouse Electric Corporation has proposed an automated urban rapid transit system designed to use 20-passenger vehicles traveling on an elevated concrete roadway at speeds up to 50 mph. Electrically driven, rubber-tired, aluminum cars would operate in trains of one to 10 units each, depending on traffic demand. Capacity of the system, with stops planned to be about 1 mile apart, would be from 5,000 to 14,000 passengers per hour (one direction). The trains would be automatically dispatched and computer controlled. The system is planned to provide around-the-clock service with a waiting time between trains of never more than two minutes.

A-064

Anon.
SOME EXPERIMENTS AND APPLICATIONS. Highway Research Board Special Report 79. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964, pp. 119-36.

Some Experiments and Applications. Nat Research Council—Highway Research Board—Special Report 79 1964 p 119-36. Review of publications on theories and experiments for development of scientific understanding of road traffic includes instrumentation, driver experiments, car following, platoon studies, continuous-stream models and application of traffic theory to flow and intersection control. 48 refs.

A-065

Anon.
SOME TRENDS IN RIVERBOAT PROPULSION. Marine Engineering/Log, vol. 61, no. 1, Jan. 1966, pp. 60-61.

The trends in riverboat propulsion are of an evolutionary nature based largely on experience. Some advances of this nature are: multiple propellers, multiple engines, multiple steering and flanking rudders, controllable and reverse pitch propellers, tunnels or Kort nozzles to direct the flow of water to the wheel. Most modern riverboats have unidirectional engines with reverse-reduction gears for faster and more dependable handling. Other means being investigated are contra-guide rudders, center-board trunk rudders, propeller-rudder combinations and various changes in hull shape.

A-066

Anon.
STATE HIGHWAY CONTRACTS: THE UP-AND-DOWN PATTERN WORSENS.
Roads and Streets, vol. 109, February 1966, pp. 50-1, 77.

A listing, by state, of state highway department construction contract awards and payments. The survey shows state awards up 5% overall in 1965 compared with a prediction of a 12% increase at the beginning of 1965. For Pennsylvania, the corresponding figures are: a revised 1965 increase of 24% compared with a beginning of 1965 estimate of 14%.

A-067

Anon.
STOL TRANSPORTS SEEN GROWING WITH AIRPORT ACCESS PROBLEMS.
Aviation Week, vol. 86, Jan. 9, 1967, p. 33.

The potential U.S. market for 30 and 60-passenger short-takeoff-and-landing (STOL) transports designed to ease the airport access problem could reach $940 million in 1975 according to a New York management consultant and economist. As traffic volume grows more frequent service could be offered. Municipalities would profit from STOL ports due to additional tax revenues from firms directly and indirectly associated with it. Development of STOL aircraft would increase airline traffic by accelerating the growth of the short-haul market.

A-068

Anon.
SUPREME COURT RULES AIRPORT LIABLE FOR NOISE DAMAGES.
Aviation Daily, vol. 139, March 6, 1962, p. 31.

A-069

Anon.

TUNNEL TRANSPORTATION CONNECTING BOSTON AND WASHINGTON. Mechanical Engineering, vol. 89, April 1967, pp. 56-7.

A condensation of an article by William Lucke, consultant to the Department of Commerce Office of High Speed Ground Transportation. The underground tunnel approach to the problem of transportation in the "Northeast Corridor" is seen as attractive because of the high cost of real estate, the increasing need for all-weather transportation and the requirements of extremely high speeds and limited right of way. The obstacles are seen as limitations in tunneling technology and geophysical testing techniques. Multiple use of the facility for utilities and mail as well as transportation is seen as making the facility more economical.

A-070

Anon.

TURBINE TRAIN TEST SLIPS FIVE MONTHS. Aviation Week, vol. 87, no. 9, Aug. 28, 1967, p. 55.

Two gas-turbine trains developed by United Aircraft Corp.'s Systems Center are running about five to six months behind schedule because of unexpected lubrication problems at low speeds. One train, consisting of three cars, with each end car powered, is to be used on Boston-New York segments, and will reach a top speed of 160 mph. Objectives of current testing are to insure adequate braking, minimal noise and sufficient air conditioning and heating.

A-071

Anon.

TWO AIRPORTS SHOW TWO CONCEPTS. Engineering News, vol. 178, no. 1, August 4, 1966. p. 16.

The two airport master plans are compared and contrasted. Kansas City's Mid-Continent will cost about $61 million with 60 gates at four terminal units. Cars and buses will enter the airport complex from U.S. 71 about 16 miles from the downtown area and feed into a one-way circular loop passing each of the four terminal units, each of which is a large circular concourse with 15 loading gates and adjunct passenger and cargo handling facilities. Cars are parked in the center of the circle. Philadelphia's International Airport is not new but an expansion of existing facilities. It is not laid out around cars but around passengers. An elevated road will serve a new four-story packing structure for the existing West Wing as well as a similar structure for the proposed East Wing. Parking capacity by 1980 is 12,000 cars. Costs and technical factors are enumerated.

A-072

Anon.
U.S. AGENCIES BOOST URBAN DESIGN WITH NEW PARTNERSHIP.
Nation's Cities, vol. 5, no. 6, June 1967. p. 18.

Three U.S. agencies (Dept. of Housing and Urban Development, Dept. of the Interior, and the Dept. of Transportation), cooperated in a study that recommended that the 1,750 -foot section of the Delaware Expressway (interstate Route 95) which parallels Independence National Historical Park be lowered and landscaped thus creating a park-like area for public use. A portion of Delaware Avenue next to the Expressway on the east should be depressed and covered. The cost of depressing and covering the Expressway ($9 million) would come from federal funds ($5.4 million), the state ($0.6 million) and from the state highway department ($3 million) (but recoverable from the Open Space Program of the Department of Housing and Urban Development and Water Conservation Fund money). The cost of the Delaware Avenue portion should come from the City of Philadelphia and the State.

A-073

Anon.
U.S. WATERWAYS NEED $8 BILLION. Engineering News-Record, vol. 165, Aug. 25, 1960, p. 28.

A brief description is presented of an Army Engineers Report on needed improvements and additions to U.S. navigable inland waterways for the 1960-1980 period. The report states that one half of the existing system requires improvement of channels, locks and terminals and recommends additional projects to carry the expected 100% increase in freight. Among these projects is a connection between the Ohio River and Lake Erie.

A-074

Anon.
WOOING THE COMMUTER. Nation's Cities,
vol. 3, no. 7, July 1965. pp. 19-20, 22.

The 75-mile Bay Area Rapid Transit system in the San Francisco area will cost $1 billion and will open in 1968 with the entire system in operation by 1971. Displays of the rolling stock feature streamlined cars with 80 mph speed, air conditioning, extra-wide seats, and handsome interiors. Frequent service is contemplated: at rush hours trains will leave every 90 seconds. Speed will be a factor: from downtown Oakland to San Francisco in eight minutes when it takes 30 by car today. The roadbed is specially designed: welded wide-gauge rails mounted on rubber pads and cushioned with new materials. The system is coordinated into a master plan for the entire region.

A-075

Anon.
WORLD AIRLINE SURVEY. Flight, vol. 87, no. 2927, April 15, 1965, pp. 562-608.

World Airline Survey. Flight v 87 n 2927 Apr 15 1965 p 562-608. Annual general survey of world civil airline industry. Contains information on over 700 operators, types of aircraft operated, building of aircraft fleet, and other particulars.

A-076

ASCE. Task Committee on Channel Stabilization Works. Committee on Regulation & Stabilization of Rivers.
CHANNEL STABILIZATION OF ALLUVIAL RIVERS. ASCE Proceedings, vol. 91, (J. Waterways & Harbors Division) no. WW1, Feb. 1955 pt. 1, paper 4236, pp. 7-37.

Channel Stabilization of Alluvial Rivers. ASCE—Proc v 91 (J Waterways & Harbors Div) n WW1 Feb 1965 pt 1 paper 4236 p 7-37. Study of channel stabilization and bank protection works on 14 alluvial streams in continental United States is reported; data on current (1954) practices of channel stabilization and bank protection work were collected and analyzed; conclusions are presented and explained in report.

A-077

Ashley, Roger H. and F. Berard
INTERCHANGE DEVELOPMENT ALONG 180 MILES OF I-94. In: Indirect Effects of Highway Location and Improvements. Highway Research Record, no. 96. Highway Research Board. National Research Council. National Academy Of Sciences, Washington, D.C., 1965, pp. 46-58.

All 66 interchanges in 180 miles of freeway in Michigan are analyzed and classified in relationship to the community with guidelines for predicting results. The four major categories were: full, partial, closed, and terminal interchanges. Variations in land uses - commercial, industrial, residential, vacant, or governmental, among the full, partial, and closed interchanges were compared. All major city interchanges developed high commercial values and at secondary city interchanges, some form of commercial development occurred. Partial or half interchanges showed little reaction and closed interchanges showed no reaction to the freeway. Business successes justified the investment in land and buildings at the interchanges.

A-078

Ashlock, James R.
EARLY SELECTION OF HELIPORT SITES URGED. Aviation Week, vol. 77, Nov. 26, 1962, p. 43.

Considerations in civic planning for heliports are reservation of sites, changes in zoning laws to facilitate heliports,and public education. Safety and noise level of helicopter operations are discussed. A recent survey showed that Pittsburgh, among other cities, provides that a heliport cannot be established even in an industrial district without a public hearing. Philadelphia has concluded that it will provide, operate and maintain public heliports. A pamphlet available to city planners on heliport dimensions is described.

A-079

Ashton, Winifred Diana
THE THEORY OF ROAD TRAFFIC. John Wiley & Sons, New York, 1966. 178 pp.

The author, lecturer in statistics at the University of Leeds, approaches the subject from a theoretical standpoint although the needs of the practicing engineer are also regarded. Four main approaches to traffic flow are described: the car-following theory involving dense traffic bumper to bumper and leading to dynamic equations; fluid analogies where the traffic is pictured as a viscous fluid. Both of the above are deterministic. A third approach uses probabilistic or stochastic models and results relating to the delay at uncontrolled (priority) and signal-controlled intersections are derived; a different approach involves simulation on a computer of a complicated traffic network. Practical applications include the optimum settings for traffic signals and methods for measuring the capacity of a highway.

A-080

Association of American Railroads, Bureau of Railroad Economics
GOVERNMENT AND PRIVATE EXPENDITURES. In: Issues in Transportation Economics. Karl M. Ruppenthal, ed. Charles E. Merrill Books, Inc., Columbus, Ohio, 1965, pp. 33-46.

Eleven tables show the expenditures by year from 1947 through 1964 (estimated) for domestic transportation, airways, airports, airline cash subsidies, highways, and waterways. The total figures include amounts for construction, operation and maintenance.

A-081

Association of American Railroads. Bureau of Railway Economics. GOVERNMENT EXPENDITURES FOR TRANSPORT FACILITIES. Association of American Railroads, Washington, D.C., March 1967.

The level of government expenditures for transportation facilities is tabulated and examined from the viewpoint that any governmental expenditures above the charges collected from the commercial users of a system, represents a subsidy to railroad competitors. The new legislation proposed by the President such as an increase in diesel fuel tax, and the use tax for heavy vehicles, a tax on fuels used on inland waterways and several new airline taxes, is described as based on the principle that those who use public facilities should bear an appropriate share of the cost of government expenditures to provide the service. Includes 11 tables on government subsidies to air, highway and waterways transportation, one showing an estimated $5.8 billion of subsidies in 1967 to these industries.

A-082

Association of American Railroads. Bureau of Railway Economics. RAILROAD MILEAGE BY STATES, DECEMBER 31, 1965. Bureau of Railway Economics. Association of American Railroads, Washington, D.C., 1966.

A statistical report summarizing mileage operated by railroads in the U.S., listed alphabetically by state. The railroads are grouped into Class I Line-haul, Class II Line-haul, and Switching and Terminal Companies. Statistics are provided for miles operated for the entire line, miles operated within the state, and per cent operated within the state. Data for Pennsylvania are presented in tables, on the next pages.

Railroad Mileage Operated in Pennsylvania

December 31, 1965

Railroad	Miles operated		Per cent operated within state
	Entire line	Within state	
CLASS I LINE-HAUL RAILROADS:			
Baltimore & Ohio RR	5 780	961	16.6
Bessemer & Lake Erie RR	201	196	97.5
Central RR Company of New Jersey	573	177	30.9
Delaware & Hudson RR	734	88	12.0
Erie-Lackawanna RR	3 007	839	27.9
Lehigh Valley RR	1 043	391	37.5
New York Central RR	9 787	761	7.8
Norfolk & Western Ry.	7 554	149	2.0
Pennsylvania RR	9 570	3 717	38.8
Pittsburgh & Lake Erie RR	212	198	93.4
Reading Co.	1 277	1 195	93.6
Western Maryland Ry.	872	239	27.4
Total Class I	40 610	8 911	21.9
CLASS II LINE-HAUL RAILROADS:			
Bellefonte Central RR	18	18	100.0
Cambria & Indiana RR	38	38	100.0
Cherry Tree & Dixonville RR	34	34	100.0
Chestnut Ridge Ry.	9	9	100.0
Cheswick & Harmar RR	4	4	100.0
Coudersport & Port Allegheny RR	24	24	100.0
Everett RR	4	4	100.0
Ironton RR	10	10	100.0
Lackawanna & Wyoming Valley Ry.	19	19	100.0
Lake Erie, Franklin & Clarion RR	15	15	100.0
Lehigh & Hudson River Ry.	98	*	**
Lehigh & New England Ry.	45	45	100.0
Maryland & Pennsylvania RR	38	37	97.4
Monongahela Ry.	168	98	58.3
Montour RR	51	51	100.0
Northampton & Bath RR	7	7	100.0
Pittsburg & Shawmut RR	97	97	100.0
Pittsburgh, Chartiers & Youghiogheny Ry.	15	15	100.0
Stewartstown RR	7	7	100.0
Strasburg RR	4	4	100.0
Unity Rys.	5	5	100.0

(Continued on next page)

Railroad Mileage Operated in Pennsylvania

December 31, 1965

Railroad	Miles operated		Per cent operated within state
	Entire line	Within state	
CLASS II LINE-HAUL RAILROADS: (cont.)			
Waynesburg & Washington RR	29	29	100.0
Wellsville, Addison & Galeton RR	80	70	87.5
Western Allegheny RR	21	21	100.0
West Pittston-Exeter RR	3	3	100.0
Winfield RR	13	13	100.0
Youngstown & Southern Ry.	50	7	14.0
Total Class II	906	684	75.5
Total Class I and II	41 516	9 595	23.1
SWITCHING AND TERMINAL COMPANIES:			
Aliquippa & Southern RR	46	46	100.0
Conemaugh & Black Lick RR	46	46	100.0
East Erie Commercial RR	12	12	100.0
Johnstown & Stony Creek RR	6	6	100.0
McKeesport Connecting RR	16	16	100.0
Monongahela Connecting RR	50	50	100.0
Philadelphia Belt Line RR	8	8	100.0
Philadelphia, Bethlehem & New England RR	60	60	100.0
Pittsburgh & Ohio Valley Ry.	21	21	100.0
Pittsburgh, Allegheny & McKees Rocks RR	11	11	100.0
Steelton & Highspire RR	32	32	100.0
Union RR (of Pa.)	275	275	100.0
Upper Merion & Plymouth RR	16	16	100.0
Total Switching and Terminal	599	599	100.0

* Less than one-half mile.
** Less than 1/10th of 1%.

A-083

Association of American Railroads. Bureau of Railway Economics.
A REVIEW OF RAILROAD OPERATIONS IN 1965, by Burton N. Behling. Special series no. 100. Bureau of Railway Economics. Association of American Railroads, Washington, D.C., 1966.

Contents include: a review of the progress achieved in 1965, the outlook for 1966, and 1965 statistics including financial results, capital expenditures and purchases, technological developments, computerization of information systems, traffic and equipment trends, employment and compensation, wage rates and prices, rates and fares, legislative activity, administrative proceedings, etc.

A-084

Association of American Railroads. Bureau of Railroad Economics
YEARBOOK OF RAILROAD FACTS, 1965-1966. Bureau of Railroad Economics. Association of American Railroads, Washington, D.C., 1965-1966.

A-085

Association of American Railroads
YEARBOOK OF RAILROAD FACTS, 1966 EDITION. Association of American Railroads, Washington, D.C., 1967.

A-086

Association of Local Transport Airlines
JET AGE ROUTE POLICY FOR LOCAL SERVICE AIRLINES. Report by the Association of Local Transport Airlines to the Civil Aeronautics Board, Jan. 25, 1966.

The volume of local airline service has continued to increase as evidenced by a map of the routes certificated to local service carriers, June 30, 1964. The quality of service has improved as indicated by statistics of equipment used, convenience of service, and fares. The critical factors (density of traffic, length of passenger haul, etc.) governing the revenue/expense relationship are discussed. Forecasts for 1970 under existing CAB policy indicate that plane-miles operated will increase 33% over 1965 and passenger miles will double the 1965 figure. The local airlines are turning to turbine power to provide the best in short-haul services with increased frequency, more express service, faster service, and lower fares. The economics of the new jets is discussed. Recommended changes in policy which will further improve short-haul service are: elimination of service to marginal points, based on higher "use it or lose it" standards, merger with trunks, merger between locals, improved working arrangements such as interchanges. It is stated that route strengthening offers the greatest potential for reducing subsidy while maintaining reasonable service to smaller cities. Appendices provide statistics on local carriers.

A-087

Association of Oil Pipe Lines. State Affairs and Legal Committee.
HANDBOOK OF THE STATE AFFAIRS AND LEGAL COMMITTEE. Association of oil Pipelines. Washington, D.C.

Contains a membership list with addresses of the State Affairs and Legal Committee.

A-088

Automotive Safety Foundation
ARTERIAL TRANSPORT SYSTEMS FOR PENNSYLVANIA, A REPORT TO THE HIGHWAY CLASSIFICATION COMMITTEE. Automotive Safety Foundation, Harrisburg, Pa., 1965.

B-001

Babcock, W.F.
ADMINISTRATIVE REQUIREMENTS FOR HIGHWAY CONSTRUCTION PROGRAMING. In: Formulating Highway Construction Programs, Workshop Conference Proceedings, Sept. 19-20, 1960. Highway Research Board Special Report 62. National Research Council. National Academy of Sciences, Washington, D.C., 1961. pp. 174-182.

The paper considers the areas of responsibility of policy making groups such as legislature, governor, highway commission and the various management levels. The advance planning operation is viewed as the key to effective planning and should be a distinct administrative unit, functioning also as liaison between departments. The detailed experience of North Carolina in this area is included.

B-002

Baggaley, P.D.
REAR-ENGINED BUSES SPEED SHEFFIELD'S TRAFFIC.
Bus & Coach, vol. 37, no. 8, Aug. 1965, pp. 278-281.

Rear-Engined Buses Speed Sheffield's Traffic, P.D.BAGGALEY. Bus & Coach v 37 n 8 Aug 1965 p 278-81. Combined fleets of Sheffield Corp and Sheffield Joint Omnibus Committee, operating 750 vehicles, comprise 165 rear-engined buses; both Leyland Atlantean and Daimler Fleetline chassis are employed, carrying 76 to 78 seater bodywork by M.C.W., Roe, Park Royal and Neepsend Coachworks; their popularity with passengers and staff is matched by substantial departmental economies made possible by large number of seats available; summary of experience gained with various designs.

B-003

Balas, E.
SOLUTION OF LARGE-SCALE TRANSPORTATION PROBLEMS THROUGH AGGREGATION. Operations Research, vol. 13, no. 1, Jan. 1965. pp. 82-93.

From a large-scale transportation problem (I) a smaller one (II) is derived by the aggregation of origins (destinations). A procedure is given to find an optimal solution $\bar{X}$ to problem I, starting from an optimal solution $\bar{Y}$ to problem II, and considering at each step only a small part of the original problem's data. While the proposed method is applicable to any transportation problem, its efficiency increases with (a) the size of the problem, and (b) the unevenness of the territorial distribution of origins (destinations).

B-004

Balkus, Kozmas
TRANSPORTATION IMPLICATIONS OF ALTERNATIVE SKETCH PLANS. In: Transportation System Analysis and Evaluation of Alternate Plans. Highway Research Record, no.180. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D. C., 1967, pp. 52-70.

Six sketch plans prepared by the planning division for a region of 30 million population were evaluated for transportation implications. The aim was to gain insight into the form of transportation network which, according to the present means of travel, would correspond to each development sketch. The patterns represent three basic patterns of regional growth: decentralized - with minimum development control; the new-town concept; and the concentration of future population in a few large urban units. The sketch plans are illustrated and factors in development enumerated. Resource commitments required for the plans are compared. Travel implications were determined in two steps: the trip-making potential for the sketches was established and estimated volumes expressed in terms relative to population increase; and communities with a capacity to support public transportation were fitted with mass transit systems. Results indicate the relative growth of mass transit and automobile modes of travel.

B-005

Barber, R.J.
SAN FRANCISCO WILL TEST FOUR ATO SYSTEMS. Ry. Age, vol. 157, no. 9, Sept. 7, 1964, pp. 22-23, 26.

San Francisco Will Test Four ATO Systems, R.J.BARBER. Ry Signaling & Communications v 57 n 9 Sept 1964 p 13-17; see also Ry Age v 157 n 9 Sept 7 1964 p 22-3, 26. Construction of 4-mi new double test track at Sacramento Northern east of San Francisco, Calif, and research projects of testing new concepts in automatic train operation systems control are described; equipment assignment for testing Bay Area Rapid Transit District laboratory cars each with different trucks, propulsion and brake systems.

B-006

Barloon, Marvin J.
THE CHANGING ROLE OF INTERCITY TRUCKING. In: Trucking And The Economy. American Trucking Associations, Inc., Washington, D.C., 1965, pp. 1-18.

Reasons for the growth of the trucking industry are examined. Growth has leveled off since 1962 when the relatively new trucking industry caught up with other transport modes. New growth reflects changes in demands for transportation. Trucking offers premium individualized service, which costs more but is valuable where small-lot shipments of high valued freight are involved. Reasons for and examples of such freight are given. The competition of other modes of transport in premium services is discussed (e.g. piggyback, air cargo). Public policy issues affecting the trucking industry are examined.

B-007

Barloon, Marvin J.
ECONOMIC POTENTIALS OF THE LAKE ERIE-OHIO RIVER WATERWAY.
In: Issues in Transportation Economics. Karl M. Ruppenthal, ed. Charles E. Merrill Books, Inc., Columbus, Ohio, 1965, pp. 10-16.

This address, given before the Mahoning Valley Industrial Council, Youngstown, presents some arguments in favor of government subsidies for the construction of this waterway. At the time the economic feasibility was still in question and the Army Engineers had not reported on anticipated costs. The author discusses potential positive effects on the economy of the region and the nation, including reduction of transportation costs of steel from Pittsburgh and Youngstown and iron ore into these cities.

B-008

Barloon, Marvin J.
THE IMPERIAL OHIO. Marine Engineering/Log, vol. 61, no. 1, Jan. 1966, pp. 54-57, 106

The navigation system of the Ohio river is 2336 miles long. and carries a large array of products including coal,industrial chemicals, crude oil, finished petroleum products, steel products and others. In 1963 the river carried 35.8% of the inland waterways tonnage in the United States. The central attraction of the Ohio river region is the low cost transportation necessary for the assembly of basic materials and fuels. The low cost of transporting coal makes electricity production cheap and thus contributes to aluminum production which requires large quantities of cheap power. The steel industry of the Ohio valley derives its competitiveness from the availability of low cost coal from the Appalachian region which contributes to employment, income, and community prosperity of these otherwise depressed regions. The recanalization of the Ohio river, scheduled to be completed in the 1970's, will eliminate congestion and open the door to lower costs and even higher traffic levels. The estimates of the Corps of Engineers of the benefit to cost ratio of this public investment range from 1.9 to 1 to 4.5 to 1, depending on the individual project.

B-009

Barmack, J.E.
METHODOLOGICAL PROBLEMS IN THE DESIGN OF MOTOR VEHICLE ACCIDENT RESEARCH. American Journal Public Health, vol. 52, no. 11, November 1962. pp. 1866-71.

The goal in accident research should be the same as in other disease control efforts: to develop means of controlling the accident and of mitigating its consequences. The author therefore reviews some of the fundamental approaches to disease control generally and examines the ways in which accident control studies have failed to provide useful information. Also, certain methodological difficulties peculiar to accident research emerge: there is little homogeneity in the properties of motor vehicle accidents: body injury and death are of greatest interest from the public health standpoint, but many studies use property damage as the criterion; "motor vehicle" as a concept lacks homogeneity; a motorcycle is uniquely vulnerable to sand and gravel on turns and a tractor trailer is peculiarly vulnerable to jackknife accidents. In many respects the study of accidents differs from the study of disease processes. The author stresses the need for direct evidence of the events preceding the trauma and the need for techniques for the collection of such data.

B-010

Barriger, John W.
AN ECONOMIC FANTASY: THE PROPOSED LAKE ERIE-OHIO RIVER CANAL. In: Issues in Transportation Economics. Karl M. Ruppenthal, ed. Charles E. Merrill Books, Inc., Columbus, Ohio, 1965, pp. 16-33.

The author, president of the Pittsburgh and Lake Erie Railroad Company, presents the negative aspects of this waterway. (For the arguments in favor see Barloon's article in this book.) He estimates the cost (one ten-mile stretch at $23 million per mile), describes its economic impracticality (the savings in transportation costs would fail to meet the annual charges of the canal by $15 million.) Adverse effects on the region, including losses to other Lake Erie ports, are described.

B-011

Bartholomew, Harland
METROPOLITAN TRANSPORTATION PROBLEM. ASCE Proceedings, vol. 91, (J. Urban Planning and Development Division), no. UP1, July 1965, paper 4391, pp. 7-18.

Inadequate planning in the past for the revolutionary change brought about by the automobile has swelled the prospective area for urbanization in our cities from 10 to 20 times the size possible in 1930. The increasing population has spilled into much of this area creating urban sprawl which increases the metropolitan transportation problem. Four areas are proposed for easing the problem. They include; taking advantage of the vertical dimension over the existing rights of way through e.g. double-deck roadways; re-evaluating the time dimension to stagger or spread the peak daily demands; a planning or design year which considers not just the foreseeable 20 year period but also the ultimate population and transportation needs as predicted in a "design population" for planning purposes which places the emphasis on population and land use reaching 40 years ahead or longer; a more coordinated implementation of plans permitting advance reservation of sufficient right-of-way to meet future demands when they arise.

B-012

Bauer, Kurt W.
EMERGING PRINCIPLES OF URBAN TRANSPORTATION PLANNING. ASCE Proceedings, vol. 91, (J. of the Highway Division), no. HW2, Dec. 1965, paper 4559, pp. 1-9.

The task of planning, designing, constructing, operating, and maintaining transportation facilities has become increasingly complex due to the growing size, complexity, and dynamic nature of current urban development. The following principles of urban transportation planning are emerging: transportation planning must be areawide or regional in scope; transportation planning must be conducted concurrently with land use planning, and must be based on long-range areawide land-use plans; highway and transit systems must be planned together and transportation facilities must be planned as an integrated system; both land use and transportation planning must recognize the existence of a limited natural resource base to which both urban and rural development must be properly adjusted; the land use and transportation planning process must be based on community development objectives and must scale the plans against the financial resources of the community. Current transportation planning programs use the following seven-step planning process: study organization and design, inventory and analysis, forecast, formulation of objectives and standards, plan design, plan test and evaluation, plan selection and adoption.

B-013

Bay, P.N.
INNOVATIONS IN A DOWNTOWN PARKING PROGRAM. Public Works, vol. 98, February 1967, p. 118.

The author, traffic engineer of San Mateo, California, describes the new parking facilities there. Innovations included the use of air rights, building under a tennis court, direct access to the rear of stores, and convenient pedestrian easements. Convenience and aesthetics were both emphasized. Financed by ad valorem benefit-assessment proceedings, the entire project provides 609 offstreet parking spaces downtown. There are two major structures and two surface lots. The total cost per stall was $3,960.

B-014

Beckman, N.
IMPACT OF THE TRANSPORTATION PLANNING PROCESS. Traffic Quarterly, vol. 20, April 1966. pp. 159-73.

The 1962 Highway Act involves local governments and state agencies in joint planning efforts. Potentialities of continuing transportation planning process are presented. The relationship between city problems and human problems is stressed. Comprehensive metropolitan planning with coordination of local governmental activities is stressed. The Advisory Commission on Intergovernmental Relations has prepared a model state bill authorizing local governments to join together to operate regional councils of governments.

B-015

Beller, W.S.
MORE FUNDS SOUGHT FOR NORTHEAST CORRIDOR PLANS. Technology Week, vol. 20, no. 2. Jan. 9, 1967, pp. 23-4.

More money is seen necessary by the director of the Office of High-Speed Ground Transportation to handle Northeast Corridor planning due to such factors as population growth and commercialization of the scarce land in the corridor and the demonstration projects such as the high-speed Boston-New York and New York-Washington rail links. Another major demonstration project calls for transporting automobiles with their occupants by rail between Florida and Virginia to allow convenient mode transfer. The purpose of the projects is to evaluate public response to such factors as new equipment, higher speeds, variation in fares, improved comfort and convenience and more frequent service. Various propulsion methods for high speed ground vehicles are being considered with linear induction seen as most promising. In the highly built up Northeast Corridor tunneling is seen as a favored route because an other-than-straight route brings up engineering problems at such high speeds. Improvements in tunneling technology are, however, needed. The Office of High-Speed Ground Transportation is now under the DOT and its operations involve not only the demonstration projects but an engineering section to develop and improve designs and a systems planning group which is developing models to simulate traffic in the Northeast Corridor in five year increments to 1990.

B-016

Bellis, W.R. and J.E. Jones
30TH PEAK HOUR FACTOR TREND. In: Highway and Interchange Capacity. Highway Research Record, no. 27. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963. pp. 1-13.

One of the problems of forecasting traffic volumes is how the 30th peak hour ratio to the annual average daily traffic (AADT) reacts to an increase in the AADT. Experience has shown that the design hour volume (DHV) rate of growth is not the same as the rate of growth of the AADT. Data from 69 counting stations that have been in operation for 10 years were used for this study because they supplied ADT, DHV and DHV factors. Seven tables and nine figures present the results of the study. The conclusions are: As the AADT increases the 30th peak hour factors generally decline; the reduction rate for high 30th peak hour factors is much greater than for low 30th peak hour factors; low population areas and sparsely developed areas usually have a high 30th peak hour factor; population changes in an area influence the DHV factors, an increase in population decreasing the factors; and the capacity of a roadway has no great influence on either DHV factors or the rate of change. It is, rather, the increase in ADT due to the increase in the off hours that tends to reduce the DHV:ADT ratio.

B-017

Benishay, Haskel and G. R. Whitaker.
TAX BURDEN RATIO IN TRANSPORTATION. Land Economics, vol. 43, no. 1, Feb. 1967, pp. 44-55.

A long-standing controversy has raged over the relative tax burdens of the regulated transportation modes. If generally acceptable conclusions could be reached on relative tax burdens, a direct attack could be made on the resource allocation implications of differing tax burdens. The objectives of this paper are to define theoretically appropriate comparative tax burden measures and, using these measures, to estimate relative tax burdens for rail and regulated motor carriers. New data developed for this study provide some resolution of the data problem. Several concepts of neutrality of taxation and of problems involved in applying these concepts to an empirical investigation are discussed. The implications of using a proxy measure, the tax burden ratio, are explored and it is concluded that useful results may be obtained by doing so. Under the criteria developed in this paper rails appear to bear from 4 to 12 times the tax burden of motors.

B-018

Bergstrom, R.N. and K.W. Hamming
LATEST DEVELOPMENTS IN TRANSPORTING COAL BY RAIL. ASCE-Proceedings, vol. 91 (J. Power Division), no. PO1, May, 1965, paper 4338, p. 81-91.

Latest Developments in Transporting Coal by Rail, R.N.BERGSTROM, K.W.HAMMING. ASCE—Proc v 91 (J Power Div) n PO1 May 1965 paper 4338 p 81-91. Recent developments of integral train are described to show how cost of coal transportation can be reduced by improvements in handling scheduling of train to minimize delays enroute; cost reductions in coal transportation due to utilization of integral or unit trains are described; two arrangements for handling integral train at power plant are described showing system of train handling and automatic car dumping without breaking train apart.

B-019

Berkley, George.
MUNICIPAL GARAGES IN BOSTON; A COST-BENEFIT ANALYSIS. Traffic Quarterly, vol. 19, April 1965, pp. 213-28.

Background and legislation concerning Boston's off-street parking problem are given. Findings of a 1964 cost-benefit analysis on municipal garages are presented. Expenditures, tax loss, loss to transit system and other costs are described. Income and property appreciation are given. The effect on the city's economy is explored. After evaluation the study concluded: that garages are being subsidized by the city, expenditures exceed income and costs exceed benefits; that the profit to the city's retail industry is not measurably affected by the presence of municipal garages; that the garages are monopolized by all day parkers; and that garages are causing more congestion than they are alleviating.

B-020

Berkowitz, N., C. Moreland and G.F. Round
PIPELINE FLOW OF COAL-IN-OIL SUSPENSIONS. Canadian Journal of Chemical Engineering, vol. 41, June 1963, pp. 116-21.

Flow behavior of powdered coal was investigated in a one-inch diameter experimental pipeline at velocities up to about 20 feet per second. Detailed technical data are given for a bituminous and a subbituminous coal. At flow velocities greater than 2 feet per second and coal concentration below 50% w/w, the suspensions were found to move as relatively homogeneous (or quasi-homogeneous) fluids.

B-021

Billyou, Deforest
AIR LAW. 2nd ed. AD Press, Ltd., New York, 1964.

A discussion of Federal and non-United States law on matters relating to airspace activity and airports, covering such aspects as airport noise, safety liability, offenses committed on board or related to aircraft, taxation, liens; together with some discussion of financing, etc. Selected administrative rulings, Executive Orders, extracts from Federal statutes having some application to aviation are also included.

B-022

Bingham, S.H.
HIGH-SPEED MASS TRANSPORT BY AN OVERHEAD SYSTEM.
Civil Engineering, vol. 31, Jan. 1961, pp. 61-64.

Various types of overhead systems are briefly described. Five overrunning and two suspended monorail systems are included. A comparison of these systems with the conventional subway for construction costs, noise level, speed, maintenance, and obstruction of light and air is presented.

B-023

Bisbee, E. Farnsworth.
OPERATIONS ANALYSIS FOR TRANSPORTATION SYSTEMS DESIGN. Paper available from the author at Massachusetts Institute of Technology. Bulletin of the Operations Research Society of America, vol. 15, Supplement 1, Spring 1967, p. B-49.

The Northeast Corridor Transportation Project begun by the U.S. Department of Commerce raises a number of issues that have traditionally been dealt with on an ad hoc basis, if at all, in the evaluation of ground systems for regional service. One such issue recognizes the prospect of new technology for the system design and leads to the question of how best to match traveler utility and system cost within feasible design alternatives. The spectrum of operating policies and their influence on effectiveness criteria are indicated by illustration of an explicit though limited first order model with externally fixed utilization functions. Computational results based on the model are presented and discussed.

B-024

Bitzl, F.
[The Implication of Excessive Highway Speeds for Highway Construction.] Die Auswirkungen Uberhönter Verkehrsgeschwindigkeiten für den Landstrassenbau. (in German) Forschungsarbeiten aus dem Strassenwesen, n.f. Heft 65, 1966.

B-025

Blum, A.M.
DIGITAL SIMULATION OF URBAN TRAFFIC. IBM Systems Journal, vol. 3, no. 1, 1964, pp. 41-7.

Digital Simulation of Urban Traffic, A.M.BLUM. IBM Systems J v 3 n 1 1964 p 41-7. Simulation methods are given for intersections and networks, vehicular characteristics and input, and network traffic control mechanism; general traffic program is described with data cards specifying geometry, signal settings, statistical distributions, and other details of particular network.

B-026

Bordley, Ralph C. and C. Tennent
APPLICATION OF CRITICAL PATH METHOD TO A HIGHWAY RIGHT-OF WAY OPERATION. In: Land Acquisition 1963. Highway Research Record, no. 54. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964, pp. 6-14.

The Critical Path Method (CPM), a management information and control tool, is discussed as a possible solution to the right-of-way acquisition problem. The CPM was studied as to its successful application to highway development, and a test application to a right-of-way acquisition project made and analyzed. Its use among states is noted and observations as to CPM techniques and the CPM network are discussed. An appendix provides a lengthy explanation of the standard right-of-way network with diagrams.

B-027

Bostick, T.A. and T.R. Todd.
TRAVEL CHARACTERISTICS OF PERSONS LIVING IN LARGER CITIES. In: Economic Forecasting. Highway Research Record, no. 106. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966, pp. 52-57.

The travel characteristics of workers residing in cities of at least 100,000 population are examined as to choice of travel mode related to: the proximity of public transportation to work, the distance to work, and the family income of the workers. Also included are analyses of automobile trips which indicate the relationship between income and trip distribution by purpose of travel. It was concluded that the automobile was used by a large proportion of residents regardless of the availability of other modes of transportation.

B-028

Bostick, T.A. and T.R. Todd .
TRAVEL HABITS IN CITIES OF 100,000 OR MORE. Public Roads, vol. 33, no. 12, Feb. 1966, pp. 274-6.

The preferences for certain modes of transportation with respect to family income are indicated in this survey. In discussing the travel habits of persons living in cities of 100,000 or more population, information is included on the availability of the nearest public transportation to work, the distance to work, and the purpose of all trips to the downtown area. It was concluded that the automobile was used by a large proportion of residents regardless of the availability of other modes. As the size of family income increased, the choice of the automobile as a commuting mode increased. Groups having the highest and lowest income reported 22% of trips were for social and recreational purposes.

B-029

Bottiny, Walter H.
TRENDS IN AUTOMOBILE OWNERSHIP AND INDICATORS OF SATURATION. In: Economic Forecasting. Highway Research Record, no. 106. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966, pp. 1-21.

Nationwide trends in automobile ownership are examined for indication of potential growth and saturation in the ratio of automobiles to population. The growth rate in automobile ownership for Pennsylvania as related to its population and age distribution, income, housing, and use of public transportation, is presented together with similar data for Philadelphia and Allegheny Counties. Saturation points in the number of automobiles per capita appear to have been reached in a number of localities, including Allegheny County.

B-030

Bouchard, Richard J. and C.E. Pyers.
USE OF GRAVITY MODEL FOR DESCRIBING URBAN TRAVEL: AN ANALYSIS AND A CRITIQUE. In: Travel Patterns. Highway Research Record no. 88. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965. pp. 1-43.

An evaluation of the gravity model as an analytic tool for the simulation of present and a forecast of future urban trip distribution patterns. The evaluation was made by comparing gravity model trip interchanges with those found in home interview destination and origin surveys (Washington, D.C., 1948, 1955). The 1955 survey data were used to calibrate the basic gravity model and then for testing the model's ability to simulate current travel patterns. The 1948 survey provided data with which to analyze the forecasts made by the calibrated model. The authors conclude from their study that the gravity model will give satisfactory results if properly calibrated and tested. This paper is a condensation: the full report can be obtained from the U.S. Bureau of Public Roads, Washington, D.C.

B-031

Bouladon, Gabriel.
THE TRANSPORT "GAPS". Science Journal, vol, 3, no. 4, April 1967, pp. 41-46.

The lack of efficient urban transport is the "Achilles heel" of the new era. It holds back town planning, increases housing costs and leads to a waste of energy and money. It is essential to provide improved means of transport adapted to new living and working conditions. There is a profusion of new means being developed. One of the most pressing problems is to fill the gaps between them. Each mode of travel has an optimum speed/distance ratio. It is inefficient to cover long distances on foot, just as it is unsatisfactory to use a car for short distances at low speeds. Experiments are being conducted by the Institut Battelle (France) on a Continuous Integrated Transporter which combines an escalator-type Integrator (which takes the passengers to the moving platforms) with a continuous moving Transporter (which carries the passengers between the stations). The advantages include lightweight equipment, small tunnels and simple operation. Existing subways could be adapted to the system, allowing them to carry far more passengers than they do now.

B-032

Boyd, R.M.
THE USER'S NEED FOR EFFECTIVE TRANSPORTATION. In: Issues in Transportation Economics. Karl M. Ruppenthal, ed. Charles E. Merrill Books, Inc., Columbus, Ohio, 1965, pp. 307-315.

In this talk given in 1961, the author traces the changes in transportation from regulated to non-regulated. In 1946, 80% of the inter-city freight ton miles were carried by regulated rail and truck carriers. By 1959, the regulated portion had decreased to 69% and the non-regulated to 31%. The rate of increase for non-regulated was estimated at about 1% per year and private transportation accounted for all the increase in inter-city freight transportation in the recent period. Private transportation is not the complete answer but commercial transportation must exercise creative imagination in devising new low-cost and expeditious ways of delivering goods.

B-033

Brady, R.P. and J.E. Walsh.
EFFICIENCY CRITERIA FOR [illegible]
BETWEEN TWO TERMINALS. Operations Research, vol. 8, [illegible],
pp. 356-61.

The ability of a given cargo aircraft and cargo-handling system combination to perform a specified task can be influenced by a large number of factors, the more important of which are identified. A quantitative criterion for measuring the relative efficiency of combined air-cargo systems is defined as proportional to: (Revenue from delivery)/(Prorated expense of this delivery). The factors are defined and the notation given for an efficiency criterion. Although developed for the case of two air-freight terminals, this criterion may be useful for situations involving many terminals.

B-034

Branch, Melville Campbell.
TRANSPORTATION DEVELOPMENTS, CITIES, AND PLANNING. American Society of Planning Officials. Chicago, 1965.

B-035

Brancker, J.W.S.
FUTURE RELATIONSHIPS BETWEEN AIR AND GROUND TRANSPORT: CORRESPONDENCE. Journal Royal Aeronautical Society, [illegible], p. 63.

A letter to the editor commenting on the article in the November, 1964 issue on this subject. It is pointed out that three separate principles were discussed in the original paper. The use of a smaller vehicle, regardless of whether a removable passenger capsule is employed, must result in some economic loss even over a range of 3000 nautical miles. The author of the original article may have been trying to stress that a passenger capsule, capable of being quickly transferred from one aircraft to another, may make it unnecessary to design a supersonic aircraft with ranges of more than 3000 miles. There is merit in the construction of an aircraft fast enough to achieve a high rate of utilization without having to fly at inconvenient times, but this only shows an economic improvement if increases in costs due to higher speeds can be offset by higher utilization. The removable passenger capsule implies the use of standard units on a worldwide basis. This may be essential in the case of a large carrier or a group of smaller ones, but it is unlikely universally. The question: can agreements be reached for all supersonic aircraft to be so constructed that they can carry two or more standard capsules, and many other practical points are raised. Finally, it is pointed out that for some time supersonic and subsonic aircraft will be sharing the same airports and facilities.

B-036

Bratkowski, W.V.
RAPID TRANSIT SYSTEM ENVIRONMENT. Journal of Environmental Science, vol. 10, April 1967, pp. 20-7.

B-037

Brewer, S.H.
THE COMPLEXITIES OF AIR CARGO PRICING. Graduate School of Business Administration, University of Washington, Seattle. 1967. 18 pp.

While the direct operating cost of flying cargo has been reduced 50% by jet cargo aircraft, there is a possibility of a further reduction of 30-35% when jumbo jets are introduced. Ground handling costs may be reduced by 60-80% by the use of mechanized and automated terminals. Air cargo will thus become competitive with surface transportation for many products. In moving from small-scale to large-scale freight transportation the air carriers must reorient and redesign their pricing structure to insulate themselves from pressures and still produce the necessary profits. Freight transportation is a leverage business: pressures for downward adjustment and equalization of prices come from sales personnel, communities promoting industry, traffic personnel, over-zealous associations and consultants. There will also be competition within the industry from convertible twin jets, tri-jets and propellor driven aircraft. There will be pressure to price to the levels of the most economic aircraft and other pressures to protect the least economic when operated by different carriers. There will be many complex objectives to be served by the pricing structure. These are outlined and the implications of each discussed.

B-038

Brewer, Stanley H. and D.T. DeCoster.
THE NATURE OF AIR CARGO COSTS. Graduate School of Business Administration, University of Washington, Seattle, 1967.

A major reason for the growth of air cargo operations is the reduction in costs. Cargo jets have converted what were once all-cargo operating losses into profits. Moving cargo in the DC-7 and the turbo-prop-powered CL-44 costs 10.06¢ and 6.71¢ per available ton-mile respectively while the DC-8F and B-707-320C costs are 3.64¢ and 3.68¢ per ton-mile. This radical drop was caused by the technological revolution now in progress. The B-747 may have costs of about 2.75¢ per ton-mile. All-cargo operations at present are suffering from attempts to obtain a profit with piston planes. Ground handling operations can be made more efficient with increased mechanization and automation. The effectiveness of these in reducing costs depends only on an increase in volume to lower the average fixed cost per unit of cargo handled. The requirement that airlines operating cargo equipment report detailed information offers hope for more accurate future costing. Adequate information is necessary for the development of a cargo-oriented industry. Comparisons of the costs of air and surface transportation of freight are presented.

B-039

Brie, R.A.C.
EXPERIENCES WITH AN OPERATIONAL HELIPORT. J. Royal Aeronautical Society, vol. 64, July, 1960, pp. 399-407; DISCUSSION, pp. 407-12.

The heliport, on the south bank of the Thames, is experimental. It uses the airspace over the river to provide convenient access to the densely populated central London area. Staff, air traffic control, night flying facilities, customers facilities, legal liability, economics, noise, plans are discussed.

B-040

Brown, B.
ECONOMICS AND FINANCE IN AIRPORT PLANNING. ASCE-Proceedings, vol. 90, (J. Aero-Space Transport Division), no. AT2, Oct. 1964, paper 4080, pp. 197-202.

Economics and Finance in Airport Planning, B.BROWN. ASCE—, Proc v 90 (J Aero-Space Transport Div) n AT2 Oct 1964 paper 4080 p 197-202. Planning function is outlined that involves economic and technical research; traffic data, airport movements, and runway utilization are criteria used to determine "economic value"; airports should be engineered in economic atmosphere capable of fully supporting projects, and industrial development of airport lands could be suitable for financing by private enterprise.

B-041

Brown, D.A.
DOWNTOWN VTOL SERVICES FACES OBSTACLES. Aviation Week, vol. 86, no. 4, Jan. 23, 1967. pp. 101, 103, 107.

A recent study by the National Aeronautics and Space Administration (Langley Research Center) has shown that the basic problem of conducting a high-angle approach to a small area under Category 2 weather conditions may be much more difficult than is generally believed. Lack of adequate instrument landing systems, cockpit displays, and piloting techniques may hamper such service; which, it is believed, may be the answer to many urban problems related to airport congestion and access.

B-042

Brown, David A.
FAA PROPOSES SWEEPING USE FEES; AGENCY SEEKS CHARGES FOR LICENSING AND CERTIFICATING AIRCRAFT, PILOTS; BROAD AUTHORITY TO OBTAIN DATA ON FLIGHT, GROUND CREWS. Aviation Week, vol. 86, no. 18, May 1, 1967, p. 26-27.

In keeping with a policy of user charges for services rendered, the Federal Aviation Administration has proposed a wide range of fees (from $244,000 for a pressurized aircraft weighing more than 55,000 lb. to $160 for a balloon) for certifying aircraft and new licenses for pilots, mechanics, instructors, or other personnel. Old licenses would be invalid after a two-year period. No new tests would be required for present license holders, but information would have to be given on an application blank (name, social security number, employer's name, kinds of certificate held, etc.).

B-043

Brown, D.A.
HELICOPTER LINE SEEKS EXPANSION FORMULA. Aviation Week, vol. 86, Jan. 9, 1967, pp. 71-72, 75, 77.

The beginnings of a regional or national commuter air service are being developed in Boston by Air General, Inc. Founded in 1962 as Massachusetts Helicopter Airlines, it currently operates five helicopters which will be converted to turbine-power by late 1968. Factors considered essential to success: all ground transportation to be eliminated from the air traveler's itinerary; ground facilities to be established wherever business is likely. Frequency of service will, it is stated, generate more passengers than will larger-capacity helicopters. Half of the 40 helistops are considered public, and are generally located in motel parking lots. Although not profitable at present, scheduled passenger traffic is considered the long-term key to success.

B-044

Brown, D.A.
HELICOPTERS SHOWING STRONG RISE IN CORPORATION SALES. Aviation Week, vol. 86, no. 10, March 6, 1967, pp. 306-311.

The growth of light, relatively inexpensive, turbine powered helicopters is expected to result in more extensive business use of the craft. Continuing corporate experience with helicopters is seen as reducing the initial resistance to executive use of single engine aircraft and the relatively large number of rotary-wing pilots currently being trained by the military is expected to be a factor in increasing sales. Also the trend to geographic diversification in industry is tending to increase the need for rapid inter-plant and inter-regional transportation. Other potential uses are in the air cargo industry and in the off-shore oil development industry.

B-045

Bruck, H.W., H. Putman, and W.A. Steger.
EVALUATION OF ALTERNATIVE TRANSPORTATION PROPOSALS: THE NORTHEAST CORRIDOR. Journal American Institute Planners, vol. 32, no. 6, November 1966. pp. 322-333.

The measurement and evaluation of the indirect consequences of alternate transportation investments in the Northeast Corridor are a subsystem of a total study. This paper describes the role of impact modelling effort within the context of the total study and explains how the demographic, economic, and land use consequences are estimated and then how these forecasts are themselves evaluated. The role of decision makers in this system seems to be that of choosing between feasible, preferred (in the economic sense) transportation systems when given the estimated costs and estimated benefits in a total framework. The criteria established for the various phases of the effort, together with the limitations of the approach used, are discussed.

B-046

Bugge, W.A.
ROAD TO HIGHWAY COOPERATION; LIAISON ON RIGHT-OF-WAY IN PROBLEMS BETWEEN UTILITIES AND HIGHWAY DEPARTMENTS. American Gas Association Monthly, vol. 42, July-Aug. 1960, pp. 19-20.

The mutual interests of the utilities and of highway departments in occupying rights of way are indicated. Controlled access highways complicate the usual arrangement since servicing the utility lines may create problems by interfering with traffic flow. The policy of the accommodation of utilities on the defense- and national system of interstate highways as adopted by the American Association of State Highway Officials and the U.S. Bureau of Public Roads is, in general, to deny permission for such accommodation. This policy may result in an increase in the cost of utilities for they are going to have to pay for their own rights of way. The case for the utilities is summarized, as is that of state highway departments. The public interest is stated to lie in cooperation.

B-047

Bulban, E.J.
BUSINESS AIRCRAFT SALES RISE FORECAST. Aviation Week, vol. 86, no. 3, Jan. 16, 1967. pp. 88-89.

In 1966 U.S. business aircraft manufacturers (such as Beech, Cessna, and Piper) delivered 15,700 new aircraft and their retail sales volume was more than $500 million. In 1967 it is expected that there will be more units sold and more gross volume due to increased sale of light and medium twins. A major concern for the industry is an acute shortage of labor. Costs for materials and for other items are going up. Competition results in increased spending for Research and Development. A table presents the shipments by type for each of the manufacturers.

B-048

Burch, Jr., Philip H.
HIGHWAY REVENUE AND EXPENDITURE POLICY IN THE UNITED STATES. Rutgers University Press, New Brunswick, New Jersey, 1962. 315 pp.

An analysis of the financing and administration of the highway system of the United States, including facts and figures on highway taxation, state and local highway administration, and expenditure policies, legislative attitudes, laws and practices of individual states at both the state and local levels, and the influence of pressure groups in the allocation of funds. The author discusses the question of quality both in planning and construction and comments on methods of collecting and expending highway revenues. He feels that the metropolitan areas have suffered from inequities of taxation and state allocation of revenue and urges long range planning and policy changes to meet the growing crisis. Includes lengthy notes on each chapter, 26 tables and a selected Bibliography.

B-049

Burns, H.C. and M.A. Warskow
OPERATIONAL PLANNING FOR GENERAL AVIATION FACILITIES AT AIRPORTS.
Journal of Aircraft, vol. 1, no. 6, Nov. - Dec. 1964, pp. 345-9.

Airborne Instruments Laboratory has developed guides for the Federal Aviation Agency of the type illustrated below, to be used to determine the utility of separate secondary runways and the resulting increase in airport capacity; tabular and graphic material show runway layouts and resulting increase in airport capacity as the secondary runway is lengthened from a minimum of 2200 ft. to lengths equalling those of primary runways.

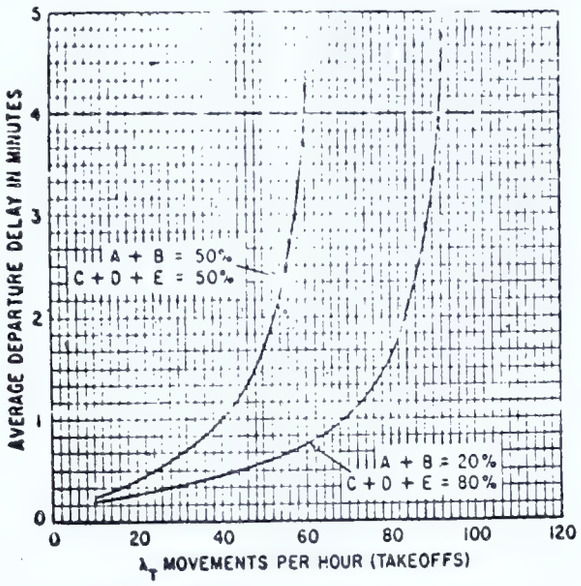


Fig. 1 Effect of population on capacity.

B-050

Butas, L.F.
SIMULTANEOUS DIFFERENTIAL EQUATIONS FOR TRIP DISTRIBUTIONS.
Traffic Quarterly, vol. 20, no. 2, April 1966, pp. 248-67.

Demonstrates an easily programmed optimization technique that gives a unique solution for the trip distribution problem through the numerical solution of parametrically linear or, if desired, nonlinear simultaneous differential equations. The distributional hypothesis employed assumes dynamic interdependence between zones with respect to their respective abilities to generate and to attract trips. The procedure for calibration of a dynamically interdependent model is given.

B-051

Byrd, L.G.
ENGINEERING APPROACH TO HIGHWAY MAINTENANCE PROGRAMMING.
Pub. Works, vol. 96, no. 2, Feb. 1965, pp. 91-3

Engineering Approach to Highway Maintenance Programming. L.G.BYRD. Pub Works v 96 n 2 Feb 1965 p 91-3. Procedure for surveying and analyzing present and future pavement conditions and planning reliable long range maintenance programs to meet them is described; procedure was used to develop 15-yr major maintenance program for New York State Thruway Authority and similar long range heavy maintenance program for northern section of New Jersey Garden State Parkway; AASHO Road Test formulas, Pavement Serviceability Index concept and CHLOE profilometer were used.

C-001

California. Legislature. Senate. Fact Finding Committee on Natural Resources.
STATE PARKS VS. FREEWAY CONSTRUCTION, AND ESTABLISHING PARKWAYS IN HIGHWAY DEVELOPMENT. Hearings, San Francisco, Dec. 16-17, 1964. (Sacramento? 1964?)

C-002

Campbell, E.W.
SOCIAL AND ECONOMIC FACTORS IN HIGHWAY LOCATION. ASCE Proceedings, vol. 92, (J. of the Highway Division), no. HW2, Oct. 1966, paper 4926, pp. 35-48.

Only after proper weighing and evaluation of all contributing factors, direct and indirect as listed below, can highway location be determined. Social and economic factors fall into four basic categories: user-direct, i.e. the benefits or costs that accrue to users of highways, measured in direct money terms; indirect-user, i.e. intangible benefits and costs; nonuser-direct, i.e. charges which accrue to persons who do not use the facility, but whose living environment is affected by its presence; nonuser-indirect, i.e. intangibles which accrue to the community in general. Individual route considerations are discussed and nine elements of traffic improvement are enumerated. The impact on existing communities is measured in terms of direct displacement resulting from right-of-way and disruption to the community.

C-003

Campbell, M.E.
PHYSICAL AND ECONOMIC RATING METHODS FOR PRIORITY CONSIDERATIONS. In: Formulating Highway Construction Programs, Workshop Conference Proceedings, Sept. 19-20, 1960. Highway Research Board Special Report 62. National Research Council. National Academy of Sciences, Washington, D.C., 1961. pp. 75-94.

Priorities are determined from comparisons of ratings with needs and available funds. A discussion of the factors in a composite numerical adequacy rating system used as a basis for transforming ratings into priorities is given. Suggested elements in the system are: user benefits in relation to cost; sufficiency; deficiency; cut off points for tolerable need and noncritical deficiencies should coincide. Need for further economic and operations research to provide suitable weighting schemes is stressed. (8 charts, 39 refs)

C-004

Campbell, M.E.
TOWARD A STRATEGY OF HIGHWAY RESEARCH ADMINISTRATION. Traffic Quarterly, vol. 21, Jan. 1967, pp. 139-155.

The author's strategy for highway research is treated in several aspects. One of these is program formulation, in which resources are matched with needs and an acceptable program is established for support and funding. It is recommended that structuring be approached by seeking out the mission of the department as a whole, and by spectra of the inanimate energies and matter. The roles of the three people responsible for highway research: the administrator, the engineer, and the research administrator, are stated in detail. Other aspects of strategy are: program framework, the project statement, the research plan, research surveillance, and the research report. The author emphasizes the need to have a policy statement to put research effort into context with the whole highway development effort, to ask the most important questions because of limited research resources, to understand the role of the participants, and to maintain a closed-circuit cooperative among administrator-engineer-researcher.

C-005

Carr, Braxton B.
OUTLOOK ON THE WATERWAYS: A DRAMATIC RESURGENCE. Marine Engineering/Log vol. 61, no. 1, Jan. 1966. pp. 46-49

The author, president of The American Waterways Operators, Inc. states that: since World War II traffic on the waterways increased by 317% and in 1964, 9.6% of the total carriage provided by all means of transportation was provided by inland water-borne commerce. The 80,000 persons employed in the industry move 14.6% of the nation's intercity freight tonnage. The waterways improvement programs permitted the industry to realize this potential and recent proposed legislation to license navigational personnel on the vessels and provide for inspection of the vessels is looked upon as posing a threat to the industry by causing higher labor costs and increased vessel construction costs. Also proposals to relieve the Corps of Engineers of their responsibility in the area and transfer it to the Department of Natural Resources and recent presidential statements calling for greater reliance on the forces of competition in transportation and for revamping regulatory laws and changing minimum rate legislation are looked on as threats to the industry.

C-006

Carroll, Jr., J.D.
NEW WAYS TO SEE LAND USE AND TRANSPORTATION. Civ. Eng. (NY), vol. 34, no. 8, Aug. 1964, pp. 62-3.

New Ways to See Land Use and Transportation, J.D.CARROLL, Jr. Civ Eng (NY) v 34 n 8 Aug 1964 p 62-3. Problems associated with keeping all parts of beehive in large metropolitan areas interconnected and functioning are discussed together with needs of people that dictate desirable land-use pattern, which in turn will indicate design of transportation system; traffic factor in assessing any land development plan.

C-007

Carter, J. W.
U. S. CARGO GROWTH RATE LAGGING. Aviation Week, vol. 86, no. 20, May 15, 1967, pp. 36-37.

A series of specific comments by officials of the air freight companies as to their present operations, the relationship to their operations last year, and the reasons for the increase or decrease. The airline strike in the summer of 1966 and the resulting shift of business to other carriers is blamed for the decrease in some instances. American, for example, in the first quarter of 1967 experienced a growth rate for freight of only 6.1% compared to 36% for all of 1966. Severe weather was blamed by certain carriers. A table gives the annual air cargo growth rate by month from October 1965 through February 1967 in terms of freight revenue ton-miles for total domestic operations, total trunks, and total domestic all-cargo carriers.

C-008

Case, C.L.
A CRITICAL APPRAISAL OF TRANSPORTATION SURVEYS. J. of the Institution of Municipal Engineers, vol. 93, no. 11, Nov. 1966, pp. 364-70.

In order to establish a sound theory of traffic generation and prediction, one must first investigate and understand the composition and nature of traffic, its cause and growth. Transportation surveys can be grouped as: the general survey of all types of transportation in an urban area; transportation surveys from areas of specific land use; and surveys of specific modes of transportation. The main tool of transportation surveys is the home interview survey complemented by roadside interviews and interviews of passengers on public service vehicles. Factors affecting prediction--social habits, vehicle growth, accuracy of mathematical models--are analyzed. The use of computer simulation for deciding mode of transportation is described. The use of the grid system for recording all trips is recommended. A comprehensive simulation prognosis can be divided into the following stages: survey, record of present travel, projection, record of future travel, and design. Surveys from areas of specific land use, traffic generation from industry, and surveys of specific methods of transportation are discussed.

C-009

Case, C.L.
JUSTIFICATION FOR SEGREGATION OF VARIOUS FORMS OF TRAFFIC. Chartered Mun. Engr., vol. 91, no. 9, Sept. 1964, pp. 313-20.

Justification for Segregation of Various Forms of Traffic, C. L.CASE. Chartered Mun Engr v 91 n 9 Sept 1964 p 313-20. Problems associated with segregation as traffic engineering measure in general, and segregation of home-based trips to industrial and central area locations in particular, are discussed; theory of traffic problem solution by means of simultaneous use of horizontal and vertical segregation is analyzed; it is emphasized that by separation of traffic making journey to work into its main component parts, coupled with judicious location of work places, efficient urban highway networks can be created.

C-010

Cassidy, William F.
THE $25 BILLION ROLE OF THE ARMY ENGINEERS. Marine Engineering/Log, vol. 61, no. 1, Jan. 1966, pp. 64-68.

There are approximately 19,000 miles of inland waterways in the U.S. in commercial use of which 12,000 miles are of the 9 ft. depth required for modern barge movement. The Corps of Engineers has constructed or improved over 500 commercial harbors on the Great Lakes, the seacoasts and the river systems. Over the last decade the annual appropriation for overall water resource development has increased 600%, and major development projects are underway on the Mississippi, the Ohio, the Illinois, the Arkansas and Verdigris Rivers, the Missouri, the Sacramento, the San Joaquin, Colombia and Snake Rivers. Construction of the 185 mile, 12 ft. high, level Cross-Florida Barge Canal from the Atlantic to the Gulf was started in 1964 and further projects are being promoted because the waterways system can be developed with the result of reducing the costs of cargo movement and enlarging the transportation potential without taking more land. A chart showing tonnage on representative waterways in the U.S. shows that in 1964 the Delaware River and tributaries carried 108 million tons, and the Ohio River 96 million tons, as compared with the Mississippi River which carried 164 million tons.

C-011

Champlin, J.B. and W.J. Eggington
NEW YORK CITY AND AIR CUSHION VEHICLE-CHALLENGE TO ENGINEER. SAE-Paper 650418 (Metropolitan Sec.) for meeting March 18, 1965.

New York City and Air Cushion Vehicle—Challenge to Engineer, J.B.CHAPLIN, W.J.EGGINGTON. SAE—Paper 650418 (Metropolitan Sec) for meeting Mar 18 1965 11 p; see also Hovering Craft & Hydrofoil v 4 n 7 Apr 1965 p 6-14; Air-Cusion Vehicles (Supp to Flight) v 6 n 36 June 1965 p 78a-79. Review of air cushion development, consideration of present vehicles and operational achievements, and analysis of possible application of vehicles representative of present state-of-art on specific route applications; use of three different types of vehicles is analyzed for New York area—20-passenger annular jet vehicle, fitted with 4-ft flexible trunks and 90-passenger plenum multicell vehicle, fitted with 3-ft flexible skirts, are considered for downtown-La Guardia route; 600-passenger vehicle is selected for downtown Manhattan to Stamford, Conn, route; operating economics.

C-012

Cherington, P.W.C.
FUTURE OF TRANSPORTATION AND REGULATION. ICC Practioner's Journal, vol. 33, Oct. 1965, pp. 5-26.

C-013

Christopher, P.
COAL PRODUCTION AND RAIL SHIPMENT FREED FROM SHIP SCHEDULES ON GREAT LAKES. Coal Today & Tomorrow, vol. 19, no. 3, March 1965, pp. 4-5.

Coal Production and Rail Shipment Freed from Ship Schedules on Great Lakes. P.CHRISTOPHER. Coal Today & Tomorrow v 19 n 3 Mar 1965 p 4-5. Large coal shiploading facility under construction at Conneaut, Ohio, is intended to make coal production independent of seasonal lake transportation; railroad schedules will no longer have to coincide with coal ship schedules; coal handling system will include 3600 tph stockpiling system and 5000 tph shiploading system; stockpiling system includes six track hoppers, 60 in. belt conveyor and traveling stacker; reclaiming is accomplished by bucketwheel coal reclaimer and by two reclaiming hoppers.

C-014

Church, Donald E.
IMPACT OF SIZE AND DISTANCE ON INTERCITY HIGHWAY SHARE OF TRANSPORTATION OF INDUSTRIAL PRODUCTS. In: Freight Transportation Economics. Highway Research Record, no. 175. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967, pp. 1-8.

Data from the 1963 Commodity Transportation Survey of The Census of Transportation are used to illustrate the relationship between the highway-carrier share of transportation of industrial products and commodity, size of shipment, and distance. The variations in the highway share associated with one factor at a time as well as with all three factors jointly are examined. Size and distance factors accounted for most of the variability in highway share, with commodity becoming significant for large shipments. The results suggested that the volume of highway intercity traffic may increase or decrease substantially without a corresponding change in total output or demand for products.

C-015

Church, Donald E.
VOLUME AND CHARACTERISTICS OF INTERCITY TRAVEL DURING WINTER 1963. In: Top Issues in Urban Research 1963. Highway Research Record, no. 64. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963, pp. 100-105.

Personal interviews of about 6,000 households in the U.S. by the National Travel Survey revealed that about 90 percent of all intercity travel during the first three months of 1963 was by highway, automobile, or bus. About one-half of this highway travel was to places more than 100 miles away from home. The appendix describes the layout of punch cards used in the survey.

C-016

Claffey, P.J.
PLANNING RAPID RAIL SERVICE FOR INTRA-URBAN TRAVEL. Traffic Quarterly, vol. 17, Oct. 1963, pp. 503-15.

With the growing urbanization of the United States, the problem of transportation to and from the central business districts of the old cities will become more pressing. Considerations and methods for transportation planning are outlined. Elements of the planning process are discussed, e.g. an inventory of present facilities, need survey, effect of alternative plans, and others. Level of service to be provided must be decided; various aspects of service such as comfort, convenience, fares, and travel time are discussed. A procedure for planning rapid rail transit incorporating the above planning elements is presented in detail.

C-017

Claffey, Paul J.
RUNNING COST OF MOTOR VEHICLES AS AFFECTED BY HIGHWAY DESIGN. National Cooperative Highway Research Program Report 13. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

Actual field measurements of fuel consumption of a standard passenger vehicle were made with the aid of a precise electronic fuelmeter. More than 4,000 test runs were conducted in which fuel consumption rates were measured at various speeds ranging from 10 to 80 mph. The fuel consumption and vehicular speeds were further related to pavement types and to roadway grades ranging from plus 8% to minus 8%. A study was also made of the fuel and time consumption of the survey vehicle during normal deceleration and acceleration for the various speed ranges. The results are presented in tabular form. Methods of measuring tire wear are evaluated and results of a field test conducted with the survey vehicle on a 65 ft. radius curve driven at 20 mph are discussed. Special studies were included to determine the effect on the accuracy of fuel consumption measurements of: wind velocity, vehicle weight, fuel characteristics, operating efficiency, and driver techniques.

C-018

Clark, Evert.
HUD TACKLES THE URBAN TRAFFIC MESS. Astronautics and Aeronautics, vol. 4, July 1966, p. 5.

Los Angeles, the Federal government and an assortment of companies are cooperating to explore the feasibility of coordinate use of a monorail train and helicopter that the city calls the Skyrail-Skylounge concept for transportation to and from airports. Administered by the new Los Angeles Department of Housing and Urban Development, the project will be funded by municipal, federal and commercial grants, the total cost amounting to approximately $734,000.

C-019

Clinton, A.C.
HOVERCRAFT NOISE. Hovering Craft & Hydrofoil, vol. 4, no. 4, Jan. 5, 1965, pp. 23-6, Feb. p. 25.

Hovercraft Noise, A.C.CLINTON. Hovering Craft & Hydrofoil v 4 n 4, 5 Jan 1965 p 23-6, Feb p 25. Review considers external far field noise generated by hovercraft and affecting terminal area and residential communities, internal noise affecting crew and passengers, and external near field noise affecting hovercraft structures and equipment; vehicle design, propulsion system, arrangement of cabin, etc, are taken into account; possibilities of attenuating sound are discussed with reference to construction and materials.

C-020

Cogan, F.
POSSIBLE SOLUTIONS TO IMPROVE NEW YORK AIRPORT ACCESS CITED. Aviation Week, vol. 86, no. 18, May 1, 1967, p. 33.

Clayton D. Peavey, acting chief of the Central Planning Division, Port of New York Authority, has stated that airport access facilities are economically unjustified unless they form a part of an integrated area transportation system. Even an airport-central business district route as heavily travelled as the one between Manhattan and Kennedy Airport does not now generate enough traffic to support a system devoted exclusively to airport-city transportation. A highway/rail vehicle has been tested at up to 50 mph and found feasible. Mass transit system solutions such as limited use highway lanes for buses and airport vehicles only, may be possible. Helicopters are not the answer because their cost of operation is such that there is little chance for them to make a dent in the problem of moving passengers to and from airports. Hydrofoils and air-cushion vehicles need more technical development before they can provide primary service at an attractive cost. Monorails are the least likely candidate; the expense of the right of way and the incompatibility with existing systems are the drawbacks.

C-021

Coleman, Robert R.
A STUDY OF URBAN TRAVEL TIMES IN PENNSYLVANIA CITIES. In: Motor Vehicle Speed, Volume, Weight and Travel Time. Highway Research Board Bulletin 303. National Research Council. National Academy Sciences, Washington, D.C., 1961. pp. 62-75.

Traffic congestion or vehicular delay is a logical factor in the determination of new highway construction sites. Therefore comparable data are necessary. This study is an investigation of methods by which traffic congestion can be estimated when only limited information is available. State highways in urban areas were considered. Limited access expressways were not. The effect that many variables (traffic volume, traffic controls and regulations, classification of streets, percentage of heavy vehicles, street width, and type of area) have on travel time was measured. Trip times were sampled through 15 test sections in five cities. The relationship between travel time and volume/capacity ratio was found to be the most useful method for estimating travel time. This study is limited to developing estimating factors. Their application to a statewide evaluation of relative traffic congestion for programming new construction is not included.

C-022

Commonwealth Conference on Community Development
PROCEEDINGS OF THE COMMONWEALTH CONFERENCE ON COMMUNITY DEVELOPMENT: PROBLEMS & PROSPECTS. Edited by Roy C. Buck and R.A. Rath. Pennsylvania State University, University Park, Pa., 1965.

A compilation of speeches by governmental officials and members of the academic community, almost exclusively from Pennsylvania, on community development, discussing its relationship to the university, its philosophy, definition, ingredients, crises facing cities, rebuilding the urban environment, land use, economic development, intergovernmental relations and cooperation.

C-023

Commonwealth of Pennsylvania.
PITTSBURGH AREA TRANSPORTATION STUDY. FINAL REPORT. IN TWO PARTS. VOLUME I. STUDY FINDINGS. VOLUME II. FORECASTS AND PLANS. Commonwealth of Pennsylvania. County of Allegheny. City of Pittsburgh. In cooperation with U.S. Department of Commerce. [Harrisburg ?] 1961. 1962.

A comprehensive study involving chapters on travel characteristics, land use, trip generation, travel facilities with a summary and conclusions. 67 tables, 71 figures and 27 maps in Volume I. Volume II projects the data into 1980 and describes anticipated urban growth, particularly in land use; future trips by auto, truck, and public transit; and highway and rapid transit planning. Conclusions and recommendations are detailed. 64 tables, 65 figures, and 39 maps in Volume II.

C-024

CONSAD Research Corporation
DESIGN FOR IMPACT STUDIES; NORTHEAST CORRIDOR TRANSPORTATION PROJECT. Prepared for the U.S. Department of Commerce. CONSAD Research Corp., Pittsburgh, Pa., August 1965.

CONSAD Research Corp. participated in the planning of economic and demographic impact analyses, the development of impact models, and measures of indirect benefits and costs of changes in the regional transportation network. In Phase I a set of operational models to evaluate proposed transportation systems in the Northeast Corridor was produced which were to provide the types of analysis previously carried out in similar regional studies. Phase II will incorporate more complex models which relate processes of socio-economic change and network link staging. Phase I uses the concept of accessibility, reflecting the consequences of changes that result from changes in transportation networks. Phase II concentrates on comparative and absolute interregional advantage, interregional resource allocation, and non-transportation policies. Model-selection criteria are presented.

C-025

Costantini, R.
ECONOMICAL LONG DISTANCE PIPELINING OF MINERALS IS NOW REALITY. Metal Mining & Processing, vol. 1, no. 11, Nov. 1964, pp. 26-9, 36.

Economical Long Distance Pipelining of Minerals Is Now Reality. R.COSTANTINI. Metal Min & Processing v 1 n 11 Nov 1964 p 26-9, 36. Proposed 1300-mi pipe line to transport potash would extend from newly developed potash mines in Saskatchewan to Chicago area and would transport 2 million tons/yr of mineral as fine slurry in saturated brine; outline of design and operating procedure for potential 500-mi pipe line to transport 10 million tons/yr of beneficiated magnetite concentrates as slurry from Mesabi region to Chicago area; costs of pelletizing should be considerably reduced when done at steel mill, due to lower costs of fuels, additives and supplies.

C-026

Courtney, A.L.
SOME FACTORS AFFECTING FARES. J. Royal Aeronautical Society, vol. 69, no. 659, November 1965, pp. 727-732.

A paper read at a symposium on Cheap Short-Range Air Transport. Short-range is defined as being 250-500 miles and cost and exchange rates are quoted for that order of range. Technical standards are discussed. The effect on fare of a 10% improvement in various areas open to the designer's skill, of changes in first cost, scheduled maintenance, unreliability, specification requirements (field length, design range, furnishings, galleys, etc., design seating capacity), operational factors are discussed, and their potential individual and combined effects shown; the combined effect of all charges being estimated at 20%. There is a distinct possibility for cheap short-haul air transport and, because of international competition with fixed fares, a specialized aircraft (an autobus) is most likely to appear first on domestic services. The full benefits of a specialized new design depend upon how soon operators begin to think along these lines and how short-haul traffic grows.

C-027

Covault, D.O. and R.C. Kirk.
INFLUENCE OF OFF-RAMP SPACING ON TRAFFIC FLOW CHARACTERISTICS ON ATLANTA FREEWAY AND ARTERIAL STREET SYSTEM. In: Freeway Operations. Highway Research Record, no. 59. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964, pp. 39-52.

Influence of Off-Ramp Spacing on Traffic Flow Characteristics on Atlanta Freeway and Arterial Street System, D.O.COVAULT, R.C.KIRK. Nat Research Council—Highway Research Board—Research Rec n 59 1964 p 39-52. Off-ramp spacing study was made in which analysis of variance techniques was used to make comparisons of volumes, speeds, densities, over-all travel, and over-all travel time data observed on all streets and freeways within system; it was found that off-ramps leading to central business district of city should be spaced as close together as possible, consistent with design factors and ability of surface streets in vicinity of off-ramp to accommodate traffic flow from ramp.

C-028

Curry, D.A.
USE OF MARGINAL COST OF TIME IN HIGHWAY ECONOMY STUDIES. In: Engineering Economy 1963. Highway Research Record, no. 77. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 48-120.

Use of Marginal Cost of Time in Highway Economy Studies, D.A. CURRY. Nat Research Council—Highway Research Board—Research Rec n 77 1965 p 48-120. Preliminary results of field study on cost of passenger car time savings, carried out to determine appropriate hours-to-dollars conversion factor for analyses and evaluations of alternative highway locations and designs; traffic projections, economy studies, and planning reports for current and future construction projects were examined in several states and costs of road users' time savings were computed on two alternate bases; results were considered from standpoint of improving data available to state highway departments for decisions about construction project alternatives and priorities. 34 refs.

D-001

Dansereau, H. Kirk, J.C. Frey, and R.D. Pasheck.
HIGHWAY DEVELOPMENT: COMMUNITY ATTITUDES AND ORGANIZATION. In: Consequences of Highway Improvement. Highway Research Record, no. 16. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963, pp. 44-59.

A research study by Pennsylvania State University measuring community attitudes towards highway improvements both before and following completion at Monroeville, Blairsville, and four interchanges in the vicinity of York. Data are also presented on population changes and on changes in local-government functions arising out of the highway construction.

D-002

Davis, E.W.
PIGGYBACKING AND ITS INFLUENCE ON TOLL FACILITY COMMERCIAL TRAFFIC. Traffic Quarterly, vol. 17, 1963, pp. 528-43.

Railroads have 5 basic piggyback plans, some totally railroad run and some, joint arrangements with truckers and shippers; these are described. Cooperation between trucking companies and railroads is discussed. The rate of growth for piggyback shipping is given in various tables. The Northeast accounted for 49.7% of the total piggyback loadings for 1962. Technological developments influencing piggyback transport are described, e.g. efforts to obtain a standard shipping container. Shipping automobiles by piggyback is promising and this application is explored. Piggybacking by air and ship is also discussed. The effect on rates, labor, taxes and tolls is described. Studies show that 95% of piggyback trips are for distances over 500 miles, and up to 20-30% savings can be realized by this method.

D-003

Day & Zimmerman, Inc.
REPORT TO THE ALTOONA AND LOGAN TOWNSHIP BUS AUTHORITY ON PRESENT AND PROPOSED BUS SERVICE IN THE CITY OF ALTOONA AND LOGAN TOWNSHIP. Day and Zimmerman, Inc. Philadelphia, Pa. 1966.

A consideration of the facilities, route locations, fare system, employee relations and nature, management, and trip origins and destinations of the existing Altoona and Logan Township Bus Authority. Recommendations of the Study include: consultations with city and township authorities to implement the study; with the union to discuss the route changes and modifications of contract; route changes; applications for State and Federal funds; and efforts to "sell" the bus service to the residents of Altoona, for the purpose of rationally handling long-standing deficits of the bus line.

D-004

Dean, Joel
COST ANALYSIS FOR COMPETITIVE RAILROAD RATEMAKING. In: Issues in Transportation Economics. Karl M. Ruppenthal, ed. Charles E. Merrill Books, Inc., Columbus, Ohio, 1965, pp. 142-156.

It is stated that four factors have contributed to the freight traffic loss of the railroads to the truckers, namely: truckers are more efficient, railroads give poor service, railroads have faulty pricing, and there has been a decentralization of economic activity. The discussion centers around faulty pricing (unrealistically high rates, rates higher for high-value commodities than for low-value commodities, lack of incentives for heavy loading, and excessive discounts for long hauls) and the role of cost analysis in pricing. An address given in 1959 to the Railroad Systems and Procedures Association.

D-005

Deem, Warren H. and J.S. Reed.
AIRPORT LAND NEEDS. Arthur D. Little, Inc., Cambridge, Mass., 1966.

A survey of airport land needs in 59 metropolitan areas on the consequences of suburbanization for airport development, financing airport development and land acquisition 1950-65, acquiring land and airport land needs and costs in the next 10 years.

D-006

Delisi, Samuel P.
COORDINATED FREIGHT TRANSPORTATION SERVICE; LEGAL AND REGULATORY ASPECTS, Part II, ICC Practitioners Journal, May- June 1967, pp. 548-590.

D-007

de Weille, Jan.
QUANTIFICATION OF ROAD USER SAVINGS. International Bank for Reconstruction and Development. Johns Hopkins Press, Baltimore, Md., 1966. 93 pp.

The ultimate aim of this paper is to contribute to a better assessment of the economic significance of road investments. It should be added that the roads in question are primarily those of developing countries. The book deals only with road-user operating costs, savings, or benefits, and does not enter the field of general social and economic consequences of the road improvement in developing countries. The book covers the following six elements of vehicle operating costs: fuel consumption, engine oil consumption, tire wear, depreciation and interest, maintenance, and occupant's (or driver's) time. These cost items are correlated with vehicle speed and developed for three classes of passenger cars and four levels of weights of trucks. The author works out the motor vehicle operating cost on three classes of roadways: good pavement, a gravel surface, and an earth surface. These three surfaces are used as typical and from their costs an individual analyst could adjust the data for particular local conditions with reference to the quality of local roadway surfaces.

D-008

Dickins, J.H.
NEW SYSTEM DEVELOPED FOR TRAFFIC DATA ACQUISITION. Traffic Eng., vol. 35, no. 3, Dec. 1964, pp. 12-15, 31.

New System Developed for Traffic Data Acquisition, J.H.DICKINS. Traffic Eng v 35 n 3 Dec 1964 p 12-15, 31. New techniques instituted by Port of New York Authority utilizing time sequenced, vertical aerial photography, permit gathering of simultaneous traffic statistics for extensive roadway networks and complex interchange systems; system is reported to have greater scope than conventional ground survey methods, and provides permanent photographic record of traffic operations for future reference or deferred analysis.

D-009

Dixon, W.J.
TECHNOLOGICAL ASPECTS OF UNIT TRAIN OPERATION.
ASME-Paper 64-WA/RR-1 for meeting
Nov. 29-Dec. 4, 1964, 4 p.

Technological Aspects of Unit Train Operation, W.J.DIXON. ASME—Paper 64-WA/RR-1 for meeting Nov 29-Dec 4 1964 4 p. Concept of operation of unit trains, i.e., solid trains carrying single commodity in substantial and continuous volume between specific points is discussed.

D-010

Donnell, P.M.
BASIC INFORMATION NEEDED FOR SOUND CAPITAL INVESTMENT PLANNING. In: Formulating Highway Construction Programs, Workshop Conference Proceedings, Sept. 19-20, 1960. Highway Research Board Special Report 62. National Research Council. National Academy of Sciences, Washington, D.C., 1961. pp. 50-56.

Sound construction planning requires establishment of an inventory of existing road plant, followed by establishment of condition ratings, road life and costs, traffic volumes on roads where these are variable, and construction of traffic flow maps. Planning for the future integrates above information with standards for various types of roads and projections into the future. Application of tolerability standards determines need for repair or reconstruction. Integration of state highway plans with urban area transportation studies and plans is essential; the latter being based on projections of urban land use, growth, estimates of needed and available funds, and schedules of such needs and availabilities.

D-011

Douglas, Peter S.,
NEW IDEAS IN RATEMAKING: MASS-PRODUCTION PRICING.
ICC Practitioners' Journal, May-June 1967, pp. 591-598.

D-012

Dyckman, J.W.
TRANSPORTATION IN CITIES. Scientific American, vol. 213, September 1965, pp. 162-74.

General aspects of urban transportation problems are discussed. The theory that traffic is a function of land use is discussed. The role of transportation facilities in forming a city is explored. The dispersive effect on city structure of higher income with its corollary increased use of the automobile, is examined. Mass transit today is unprofitable for owners and unattractive to users. The difficulties of transit systems are discussed. Plans for making mass transit more competitive with the automobile are explored. The San Francisco Bay Area Rapid Transit District is examined in detail. Efforts to accommodate increased automobile usage are also discussed.

E-001

Eckert, Edward C.
A CONCEPT FOR INTERSTATE SYSTEM REST AREAS. In: Roadside Development. Highway Research Record, no. 23. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963. pp. 42-46.

Rest areas should have toilet facilities that are easily accessible and close to the parking area. The well should conform to local health standards and should be easily reached. Telephones should be in keeping with the rule of least inconvenience. All buildings and grounds should be well lighted and the lights turned on and off by a photoelectric eye. Sidewalks should link the different facilities. Refuse barrels should be provided and plainly marked to encourage their use. Landscaping should provide a park-like atmosphere but no attempt should be made to hide the toilets. A survey has shown that 43% of the persons who stopped at rest areas used the toilet facilities first. The next most popular service was resting (23%), followed by drinking water (20%), picnicking (4%) and 9% used bulletin boards, trash cans or telephones. Maintenance must be of a high and continuous standard. Neglect breeds neglect and mis-use on the part of the public with the final result of excessive vandalism and loss of respect. The first item of maintenance is that of the toilet facilities and the author discusses this problem in some detail. Periodic night visits by law enforcement officers may be necessary since these rest areas must be open 24 hours daily.

E-002

Edwards, Gordon
PLANNING THE METROPOLITAN AIRPORT SYSTEM. Federal Aviation Agency, Washington, D.C., 1964. IR 8344

E-003

Edwards, L.K.
HIGH-SPEED TUBE TRANSPORTATION. Scientific American, vol. 213, Aug. 1965, pp. 30-40.

A pneumatic tube train originally proposed by Lockheed for use in the Northeast Corridor is described. The proposed train will travel at an average speed of 200 mph with cruising speeds over 400 mph. The system would have a peak capacity of 9,000 passengers/hr. A single train will make a round trip in about 4 hours. The trains can also carry express cargo. The tubes will be in a tunnel, would float in water, and trains will travel on steel wheels on steel rails. Technology of the above components of the system is discussed as well as car construction; the pneumatic propulsion system is described in detail. A modification of the system for urban mass transit is also described in some detail.

E-004

Enfield, F.D. and J.R. Tuggle.
NEW TECHNOLOGY FOR SST MAINTENANCE. ASME-Paper 65-AV-12 for meeting Mar. 14-18, 1965. 11 p.

New Technology for SST Maintenance. F.D.ENFIELD, J.R.TUGGLE. ASME—Paper 65-AV-12 for meeting Mar 14-18 1965 11 p. Factors influencing profitability of commercial supersonic transport (SST) are examined and need for reducing unscheduled flight line maintenance is identified; several promising approaches are discussed and design criteria for airborne maintenance-analysis system are developed; essential airborne elements of system are, central processing and control unit (digital computer), remote sensor and/or conditioner units, indicator and multiplexer/converter units; example shows how airborne maintenance-analysis equipment could help to provide increased utilization; estimates for development costs of system and cost of equipment per aircraft.

E-005

England, A.C.
BALANCING OF PHYSICAL AND ECONOMIC RATINGS WITH OTHER CONSIDERATIONS TO ESTABLISH PROJECT PRIORITIES. In: Formulating Highway Construction Programs, Workshop Conference Proceedings, Sept. 19-20, 1960. Highway Research Board Special Report 62. National Research Council. National Academy of Sciences, Washington, D.C., 1961. pp. 95-108.

In establishing project priorities legislative directives, maximum use of federal funds, coordination with other state's systems, must be considered. Economic analysis is used to determine the importance of the construction and a method of setting up sufficiency ratings on existing roads is detailed with charts, as is done in New Mexico. (8 charts)

E-006

Evans, D.H., R. Herman and G.H. Weiss
HIGHWAY MERGING AND QUEUING PROBLEM. Operations Research, vol. 12, no. 6, Nov.-Dec. 1964, pp. 832-57.

Highway Merging and Queuing Problem, D.H.EVANS, R.HERMAN, G.H.WEISS. Operations Research v 12 n 6 Nov-Dec 1964 p 832-57. Study of several aspects of theory of car queues for situation in which there is traffic on main highway and queue of cars on side road waiting to merge; expressions for generating function of steady-state and waiting-time distribution are derived; critical input to side road is determined such that for all larger inputs queue is transient; effect of move up time on queue is considered in particular. 20 refs.

E-007

Evans, H.K.
TRANSPORTATION PLANNING CRITERIA FOR NEW TOWNS. In: Planned Communities. Highway Research Record, no. 97. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965. pp. 30-51.

The need for thorough traffic estimation and the synthesis of future travel patterns for new towns is emphasized. The economic-base study is one of the most important criteria affecting plans. This should be considered along with the initial investigations of the physical, legal, and financial features of new town development. These criteria determine the volume and pattern of traffic as well as the interchange between the new town and adjacent communities. There must be feedback between the preliminary findings of the transportation planners and the economic-base land-use planning team. The latter's projects and suggestions may then be modified to produce acceptable transportation conditions. Illustrative maps, tables, and data are presented for two proposed developments in California. When preliminary plans were examined, impossible traffic densities were predicted and the proposed land-use densities and dispositions had to be changed. The author summarizes the steps in transportation planning: formulation of trial road networks, based on preliminary land-use plan, trip-generation estimates, estimate of interchange between new town and other communities and through traffic, trip distribution, trip assignment to alternate routes, evaluation and feedback as necessary, selection and staging of transportation plans.

F-001

Farrell, F.B.
HIGHLIGHTS AND SIDELIGHTS OF FEDERAL-AID HIGHWAY PROGRAM. SAE-Paper S426 (Central Illinois Sec) for meeting Apr. 6-7, 1965, 6 p.

Highlights and Sidelights of Federal-Aid Highway Program, F.B.FARRELL. SAE—Paper S426 (Central Illinois Sec) for meeting Apr 6-7 1965 6 p. Review of United States' Interstate road program, and scope, functions and role of U S Bureau of Public Roads; partnership arrangement between U S Bureau of Public Roads and State highway departments is prime reason for success

F-002

Fitch, L.C.
SUMMARY AND RECOMMENDATIONS. In: Urban Transportation and Public Policy. Chandler Publications, San Francisco, Calif. 1964, pp. 1-8.

The preponderance of urban transportation demand is for intra-urban travel, which differs from interurban travel in the purpose, length, frequency of trips, in routes, and in modes of transportation. Urban transportation has suffered from the lack of comprehensive planning coordinated with land-use-and-development. It should deal with transportation problems on an over-all integrated basis with private and public transportation on an equal footing. Mass transit was found to be more efficient in land use and less costly than the private automobile. It is recommended that direct federal assistance used to support specified transportation services or to stimulate improvement of capital facilities should go only to local or state governments. Specific recommendations for a federal program include: matching grants or loans to state or local public agencies for mass-transportation-improvement projects conforming to comprehensive regional plans; and an interim program of assistance for high-priority projects. The amount of federal assistance needed nationally for urban transportation over a 10-year period is estimated at $9.8 billion.

F-003

Fitch, L.C.
THE URBAN-TRANSPORTATION PROBLEM. In: Urban Transportation and Public Policy. Chandler Publications, San Francisco, Calif., 1964, pp. 9-24.

The most troublesome urban-transportation problem is meeting the peak demand of the journey-to-work in the largest metropolitan areas, with the recreation peak problem second. Current measures to relieve congestion will become increasingly inadequate. Deficiencies of mass-transportation operations are discomfort, inconvenience, low average speed, and obsolescence. Urban transportation has created unattractiveness of land use, as well as health hazards in air pollution. Fragmentation of planning and administration with short-comings in personnel and finance are among institutional deficiencies. Commuter railroads are the weakest elements, financially. Conceptual deficiencies include the paucity of research-and-development studies and unsettled issues of objectives of urban design and land-use planning, of comparative roles of modes of transportation, of optimum means of financing intra-urban transportation, and of objectives and techniques of planning.

F-004

Flaherty, Mark C.
COMMERCIAL HIGHWAY SERVICE DISTRICTS AND THE INTERSTATE. In: Indirect Effects of Highway Location and Improvements. Highway Research Record, no. 96. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965. pp. 8-18.

A method is suggested by which local officials can better guide land-use development opportunities available as a result of Interstate highway construction. The commercial businesses which directly serve the road user are automotive service and highway-oriented retail and personal service. Protective regulatory standards to guide proper site development should be established specifically for these highway service districts. When considering locations for these districts the factors of interchange function and design, traffic conditions, user costs, and land-use environment should be appraised, and indices are suggested. Techniques and results from the West Duluth study are presented by way of illustration of the implementation of the above considerations. Prudent control of land use can only be accomplished by cooperative efforts of state and local authorities.

F-005

Fleischer, G.A.
EFFECT OF HIGHWAY IMPROVEMENT ON TRAVEL TIME OF COMMERCIAL VEHICLES; A TWENTY-FIVE-YEAR CASE STUDY. In: Highway Economics, Highway Research Record, no. 12. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963. pp. 19-47.

Studies of actual economic analyses of highway improvement expenditures and time savings indicate that decisions are frequently quite sensitive to the way in which analysts treat the value of time saved. This paper deals principally with the method of introducing such savings into the analysis with the aid of a numerical case study, examining in detail comparative data for two major sections of highway and a principal commercial user over a 25-year period. Evidence indicated that time does not become economically significant simply because it is released by highway improvement; there is a considerable gap between the point at which time is saved and that at which it can be utilized in an economic sense. This conclusion may imply a need for a re-examination of time-savings formulas.

F-006

French, A. and T.S. Dickerson, Jr.
TRAVEL BY MOTOR VEHICLES IN 1963, 1964, AND 1965. Public Roads, vol. 34, February 1967. pp. 132-3.

Annual travel statistics are presented in tabular form for passenger and commercial vehicles. Motor-vehicle travel is presented for main and local rural roads, and urban roads. Data are given on vehicle registration, average travel per vehicle, motor-fuel consumption, and average travel per gallon of fuel consumed.

F-007

Friedlander, Gordon D.
RAILWAY VS. HIGHWAY - THE ZOOM OF THINGS TO COME. IEEE Spectrum, vol. 4, no. 9, Sept. 1967, pp. 62-76.

Cities which have applied the concept of balanced transportation to their systems are: Chicago, Toronto, Cleveland, and San Francisco, as well as the Northeast Corridor region. DOT's High-Speed Train Evaluation Project, (the train which is expected to reduce the time between New York and Washington to 2 hours and 18 minutes) is described. Innovations in transportation currently in the design or testing stages include the Budd Company's skylounge and skycrane, a monorail and capsule system, the gravity-vacuum tunnel, and tubelight vehicles.

F-008

Fromm, Gary, ed.
TRANSPORTATION INVESTMENT AND ECONOMIC DEVELOPMENT. Transport Research Program. Brookings Institution, Washington, D.C., 1965.

F-009

Frye, F.F.
EFFECT OF AN EXPRESSWAY ON DISTRIBUTION OF TRAFFIC AND ACCIDENTS. In: Freeway Operation. Highway Research Record, no. 21. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963. pp. 90-105.

The building of the Congress Expressway in Chicago resulted in a 25% reduction in the number of accidents in the study area (which included the Expressway) despite an approximately 20% increase in weekday traffic. By comparison, a 14% increase in traffic in 3 control areas was accompanied by a 14% increase in the number of accidents.

F-010

Fulda, Carl H.
COMPETITION IN THE REGULATED INDUSTRIES: TRANSPORTATION. Little, Brown and Co., Boston, Mass., 1961.

Competition and regulation of interstate transportation, embracing railroads, motor and water carriers, airlines and freight forwarders, is discussed. Rate agreements in surface transportation, intermodal competition and common ownership of several modes of transportation, and the relationship between the courts and the administrative agencies is presented.

G-001

Galbreath, R.V.
COMPUTER PROGRAM FOR LEVELING RESOURCE USAGE.
ASCE Proceedings, vol. 91, (J. Construction Division), no. CO1, May 1965, paper 4327, pp. 107-24.

Computer Program for Leveling Resource Usage. R.V.GALBREATH. ASCE—Proc v 91 (J Construction Div) n CO1 May 1965 paper 4327 p 107-24. Computer program is presented that is to perform task of leveling resource usage for project using as input critical path method solution for event times and floats; manipulations of activities follow predetermined order of selection; order of selection is explained with good and bad features noted; control of individual problem is provided to user through ability to vary several inputs; program is designed to accept superposition of additional criteria for manipulation.

G-002

Garcia, Danilo M., and J.H. Jones
HIGH DENSITY VEHICULAR FLOW-DENSITY RELATIONSHIPS. ASCE Proceedings, vol. 91, (J. of the Highway Division), no. HW2, Dec. 1965, paper 4581, pp. 37-49.

Assuming some continuous functions to connect limiting values of speed and density, diagrams of the speed-density, flow-density, and flow-speed relationships can be postulated. The asymptotes denote the extreme conditions of an empty roadway and a traffic-jammed roadway. Much of the work related to road traffic flow has been based on car-following theories, which may be classified as individual car-following or macroscopic car-following. Two models have been used extensively: Greenshield's model plotted speed against density for single-lane traffic and fitted a straight line to the points. Greenberg's model is based on assumptions of continuity and the equation of motion for an inviscid, compressible fluid. In applying these models in an experiment, it was found that for conditions of macroscopic car-following, the flow-density-speed relationships may be described by either model, with no conclusive evidence indicating a discontinuity in the flow-density curve.

G-003

Gardner, E. H.
THE CONGESTION APPROACH TO RATIONAL PROGRAMMING. In: Highway Needs and Programming Priorities. Highway Research Board Bulletin 249. National Research Council. National Academy of Sciences, Washington, D.C., 1960. pp.1-23.

A proposed priorities rating formula for highway evaluation for the Commonwealth of Pennsylvania is described. The formula is suitable for electronic data processing. Tables and graphs show road life expectancy for various types of roads, urban street capacities, traffic volume, intersection capacities, travel time and other data.

G-004

Garrison, W.L., E.N. Thomas, and R.D. Worrall.
DATA SYSTEMS REQUIREMENTS OF URBAN AND REGIONAL POLICY MODELS. Research Report, Transportation Center, Northwestern University, Northwestern University, Evanston, Illinois, Oct. 1966, 44 pp.

This paper concentrates on three interrelated topics. First, a review and critique is presented of the adequacy of those data systems on which the main modeling efforts at the present time are based. Certain desirable properties of models are discussed. The final section contains statements of data systems requirements. The paper contains a mixture of reviews of the state-of-the-art of modeling and of data systems, of recommendations and of programs of development. Such a mixture necessarily contains elements of opinion, judgment, and synthesis; therefore, to establish the point of view, references to the literature are used to document the statements wherever possible.

G-005

Gazis, Denos C.
MATHEMATIC THEORY OF AUTOMOBILE TRAFFIC. Science, vol. 157, no. 3786, July 21, 1967, pp. 273-281.

A review of mathematical traffic flow models including the following: car-following models, the problem of pedestrian crossing and other conflicts in traffic, synchronization of traffic control, and traffic assignment. 80 references.

G-006

George, Stephen Jr. and C.E. Pyers.
APPLICATION OF CRITICAL PATH PROGRAMMING TO LARGE-SCALE TRANSPORTATION STUDIES. In: Highway Research News, no. 12. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., June 1964. pp. 51-65.

The use of a managerial tool, critical path programming, has been applied to large-scale urban transportation planning programs. The method is based on the premise that if any single object or activity in a chain of projects or events can be referenced to other activities that must precede or follow it, if activities that can be in operation simultaneously can be identified, if an estimate of manpower for each activity can be assigned, the path of critical flow that identifies the controlling activities can be analyzed and rescheduled to minimize time, effort, and cost. The application of this Critical Path Method to the Puget Sound Regional Transportation Study is described. Although it may be applied to countless fields, it must be emphasized that the method is only as good as the input available. The historical data regarding the breakdown of a transportation study into activity or job costs and duration time of a job need improvement. When transportation studies can be separated into individual activities as cleanly as in a construction project, the use of the critical path analysis will become even more valuable. It is particularly valuable during the planning and study design phase.

G-007

Gerlough, D.L. and F.A. Wagner.
IMPROVED CRITERIA FOR TRAFFIC SIGNALS AT INDIVIDUAL INTERSECTIONS: INTERIM REPORT. National Cooperative Highway Research Program Report 3. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964.

After a review of the literature, a computer simulation model was employed to handle all of the important factors in traffic performance at isolated intersections. Various portions of the preliminary model were tested separately and in combination with other portions and compared with empirical facts and the model was then modified and refined. The resulting model is described as considering a mixture of vehicle types and velocities; as sufficiently detailed to permit measurement of a full range of traffic characteristics, and as characterized by flexibility by which many alternative control schemes may be submitted for testing and evaluation. Contains a comprehensive 282-entry Bibliography; with 29 entries being given individual abstracts.

G-008

Gern, R.C. and H.R. Joyner
CROSSROUTE ACCESS DESIGN IN INTERCHANGE AREAS. In: Freeway Operations. Highway Research Record, no. 59. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964, pp. 1-8.

Crossroute Access Design in Interchange Areas, R.C.GERN, H.R.JOYNER. National Research Council—Highway Research Board—Research Rec n 59 1964 p 1-8. Design factors which influence extension of access control for certain distance along crossroute are analyzed; approximately 60 of most common and important design situations were studied in detail; for each of these situations controlling design elements, i.e. merging, deceleration distances, storage, etc were determined and combined into equations; equations can be solved to give proper spacing between ramp terminals and access points along crossroute; their application in highway design is shown through use of illustrative design problems.

G-009

Gervais, E.F.
OPTIMIZATION OF FREEWAY TRAFFIC BY RAMP CONTROL. In: Freeway Operations. Highway Research Record, no. 59. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964, pp. 104-118.

Optimization of Freeway Traffic by Ramp Control, E.F.GERVAIS. Nat Research Council—Highway Research Board—Research Rec n 59 1964 p 104-18. Study was carried out at nine entrance ramps in 3-mi study area on John C. Lodge Freeway, Detroit, Mich to develop freeway variable traffic control system with ramp entrance control permitting opening or closing of ramp; each of entrance ramps was placed under control of ramp signal bearing message "Don't Enter"; signal is blankout type device that shows message only when signal is illuminated; review of week's study shows that great gain in freedom of traffic flow is possible by use of ramp closure system.

G-010

Gilbert, J.
POTENTIAL FOR INTERNATIONAL COMMERCIAL AIR SHIPMENTS. SAE - 2nd International Forum for Air Cargo. Proceedings May 26-28, 1963, pp. B1-11.

Potential for International Commercial Air Shipments, J.GILBERT. SAE—Int Forum for Air Cargo, 2nd—Proc May 26-28 1963 p B1-11. Paper defines scope and dimension of cargo market; basic information is derived from official United States Government data which provide complete coverage of market; subject is analyzed by air gateway, route, commodity, tonnage and value; air shipments are compared to total traffic moving in various markets by all modes of transport; aggregative technique is used for discussing alternative trend lines for forecasting gross tonnage and their impact upon international air cargo industry.

G-011

Gillilland, Whitney
CAB CO-ORDINATION OF UNLIKE MODES OF TRANSPORTATION. Public Utilities Fortnightly, Sept. 2, 1965, vol. 76, pp. 15-28.

The basic premise of the CAB had been to keep the various modes of transportation separate and distinct to encourage competition. Gradually this philosophy has changed to provide for greater co-ordination between modes. In the Transportation Message of April 5, 1962, President Kennedy recommended that Congress declare that through routes and joint rates be vigorously encouraged, and authorized all transportation agencies to participate in joint board. He emphasized the need for co-ordination of policies and requested that the chairmen of the CAB, the ICC, and the Federal Maritime Commission meet frequently to discuss regulatory problems and seek co-ordinated solutions. A number of legal and administrative decisions are reported to illustrate the thesis of the article.

G-012

Granum, James O. and C. H. Burnes.
ADVANCE PROGRAMMING METHODS FOR STATE HIGHWAY SYSTEMS. In: Highway Needs and Programming Priorities. Highway Research Board Bulletin 249. National Research Council. National Academy of Sciences, Washington, D.C., 1960. pp. 23-51.

An examination of the decision-making processes involved in selecting highway improvement projects in certain states and a Canadian province is reported in this paper. It is concluded that eight major factors that must be present for most effective programming of work are: legislative support; executive action; factual survey; budget decision, systematic priority analysis; systematic coordination; scheduling and control; and administrative organization. These are briefly described and illustrated by example. Adequate advance programming requires firm and stable policies, well understood by staff, and full implementation of the entire "package" of those eight factors.

G-013

Greenwood, George Watkins
TRAFFIC LINKAGE PATTERNS BETWEEN A METROPOLITAN AREA AND THE COMMUNITIES WITHIN ITS REGION OF INFLUENCE. Engineering Publication Office. University of Illinois, Urbana, Ill.,1966.

G-014

Griffiths, Leon
THE ELECTRIC CAR. Automobile Engineer, vol. 57, no. 9, Aug. 1967, pp. 329-340.

The electric car with all rotary drive, continuously progressive speed control, instantaneous starting, and silent, smooth, fumeless operation is described. Even though the cost of this vehicle is much greater than a comparable gasoline-powered vehicle, the substantially lower operating costs together with the small servicing requirements mean at least 25 percent less overall cost. It is eminently suitable for local delivery service. Even with its range limitation it would find a market as a city and suburban car. The advances in electric batteries are reported along with performance statistics. Electric vehicles now in operation are described with illustrations.

G-015

Guandolo, John.
TRANSPORTATION LAW. W.C. Brown Co., Dubuque, Iowa, 1965.

The interpretations and applications of the Interstate Commerce Act, the Federal Aviation Act, and related acts, together with decisions of the ICC, CAB, Federal Maritime Commission, and the courts have been analyzed; the principles of law arising from them have been discussed in terms of interpretation and application by administrative bodies and courts. The material is organized into 55 chapters, basically in the form of treatments by subject heading. There is no discussion of state law or state administrative or regulatory agencies as such; but the question of Federal vs. state jurisdictions is covered.

G-016

Gunston, W.T.
RAILWAYS OF THE FUTURE. Science Journal, vol, 3, no. 8, Aug. 1967. pp. 34-45.

A discussion of what can be done to improve existing railways and consideration of the optimum form of high speed ground transport. Aerospace techniques have improved understanding of vehicle stability power. Future passenger vehicles will be designed unconventionally but, except for special cases, they will run on tracks. The ratio of power to weight must be raised to several times its present level for high speed, hence efforts have been made to reduce train weight. Wheel adhesion is a central factor affecting the performance of a railway, and efforts to influence it are reported. The only form of motive power for the required power/weight ratio on unimproved and non-electrified track is the gas turbine. The importance of aerodynamic design at higher speeds is stressed. The turbine motor train, part of the Northeast Corridor transport program, will cost about 30% less per mile to run than a conventional train of the same capacity on the same route. Possible schemes of improved communications are analyzed. Complete computer modelling of an entire railway is recommended as a technique. The major variables in any high speed ground transport are the vehicle size, scheduling policy, method of propulsion, type of guideway and control system. Non-wheeled systems are discussed. Maximum operating speeds are presented for a number of high-speed ground transportation developments.

H-001

Haar, C.M.
TRANSIT AND THE GHETTO. Nation's Cities, vol. 5, no. 1, Jan. 1967. pp. 7-9.

The activities of HUD, through the Urban Mass Transportation Act of 1964 which awarded grants for the provision of transportation to low-income groups in urban areas, are reviewed. HUD is using its transportation programs as part of a self-help policy to overcome the disadvantages of ghetto living so that ghetto dwellers may take advantage of available employment, cultural and health services, shopping and recreation facilities. HUD approved a $2.7 million research project in Watts to study the relationship between a public transportation system and job and other opportunities of low income groups. A $482,000 demonstration project grant to Nashville proposes to test the effectiveness of express bus service in meeting the transportation needs of low-income outpatients and hospital employees. Other projects are described.

H-002

Haar, Charles M.
URBAN TRANSPORTATION RESEARCH. Civil Engineering, vol. 37, no. 9, Sept. 1967, p. 64.

The author, Assistant Secretary for Metropolitan Development, U.S. Department of Housing and Urban Development, describes the eight contracts awarded in July 1967, designed to obtain solutions which may be developed in 6 months to 3 years, in 3 to 8 years, and in 5 to 15 years in the following areas: a comprehensive systems analysis, computer based, of urban transportation problems and their solutions; also certain specific elements such as a bi-modal small vehicle capable of traveling on both ordinary streets and high-speed automated guideways, electronic command and control systems, and methods of introducing innovations without neighborhood disruption. The institutions receiving the contracts are named and the scope briefly described.

H-003

Habeck, W.J. and R.F. McNamara
ECONOMICS OF SLURRY PIPELINES. Iron and Steel Engineer, vol. 40, August 1963, pp. 137-41.

Pipelines can be used to transport almost any solid material if we neglect economics and if three conditions are met: the solids must not undergo any undesirable change as a result of the mixing or of the separation of the solids and liquid, or in the actual process of transportation itself; the slurry should not vary widely in viscosity; and the particle size should not be too large. The hazards of trying to use unit costs are shown by means of examples. Recent economic studies of the capital and operating costs for slurry transportation are tabulated, slurry line sizes, lengths, annual tonnages, construction costs, and operating cost per ton mile are all investigated in tables reflecting 1963 price levels. Slurry preparation, pumping stations, transmission lines, dewatering and drying, and over-all economics are discussed.

H-004

Haight, Frank A.
MATHEMATICAL THEORIES OF TRAFFIC FLOW. Academic Press, New York, N.Y., 1963.

Traffic flow is discussed from the following aspects: probability and statistics, theory of queues, fundamental characteristics of road traffic, arrangement of cars on a road, the simple delay problem, a two lane road, and miscellaneous problems.

H-005

Hamburg, John R., et al.
LINEAR PROGRAMMING TEST OF JOURNEY-TO-WORK MINIMIZATION. In: Urban Transportation Planning: Techniques and Concepts. Highway Research Record, no. 102. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965. pp. 67-75.

Sensitivity to travel time is measured by an "index of indifference" which endeavors to measure the extent to which linkages among urban space activities are indifferent to time. The data used were from the Niagara Frontier Transportation Study and the analysis showed that people are really not indifferent to time. They do not, however, organize their linkages to expend the minimum amount of time on travel, although they do show more minimization than indifference. When the data were stratified by income class, it was observed that those in the highest class tended to be indifferent to travel time as measured by the index. Both the middle- and low-income groups tended to be more sensitive to travel time. When the data were stratified by race and by auto availability, the results were inconclusive. The authors point out that the index may be used in the study of other types of activity: retailing and recreation areas, or school-home, for example.

H-006

Hamilton, Calvin S.

THE DEVELOPMENT OF A LAND-USE DATA BANK FOR TRANSPORTATION PLANNING. In: Top Issues in Urban Research 1963. Highway Research Record, no. 64. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963, pp. 84-99.

The different levels of data collection necessary for transportation planning are discussed. The land-use and other data programs used for identifying the relationship between the types of detailed data and resulting information needed for planning transportation facilities by the Pittsburgh Department of City Planning are described. One of the biggest problems was managing the wealth of data for different geographic areas with overlapping boundaries solved by the concept of a "data block" which roughly corresponds to a city block. The use of simulation and the type of outputs it will produce is described for the Pittsburgh Community Renewal Program. Appendices provide a summary of the likely results of the Community Renewal Program and a description of an information system.

H-007

Hamshaw, Thomas C.J.

STEPS TOWARDS LOWER OPERATING COSTS WITH CONVENTIONAL JET TRANSPORTS. J. Royal Aeronautical Society, vol. 69, no. 659, November 1965, pp. 737-743.

A paper read at a symposium on Cheap Short-Range Air Transport. The future of both the manufacturer and of the operator depends on ever lower fares. This paper notes some of the difficulties seen from the manufacturer's side. No answers are proposed, but raises some important issues, particularly those commonly taken for granted: for example, who pays for what?, aircraft first prices, labor costs, production runs, longer airframe lives, improved reliability, a typical revolutionary change—the very large aircraft. Data on prices, productivity and utilization show no advantage in bigger or faster aircraft—in fact the reverse; and that it almost always pays to buy a secondhand aircraft. The aircraft manufacturer faced with such analysis is forced into long range supersonic aircraft production for revenue rather than traffic reasons, is receptive to evolutionary rather than revolutionary ideas; and must also favor international cooperation to realize the full potential of his products. The next generation of aircraft will require all our skills to keep costs below today's.

H-008

Hand, I. and C.D. Hixon.
PLANNING TRAFFIC AND TRANSPORTATION IN METROPOLITAN AREAS. Traffic Quarterly, vol. 17, April 1963, pp. 254-73.

Various Federal bills, reports and presidential messages are quoted to emphasize the crucial role of transportation in urban planning. Transportation planning must be comprehensive and must be done in close coordination with other aspects of urban planning. Community and transportation planning in Nashville and Davidson County, Tennessee, is described in detail. The proposed tasks of the Nashville Metropolitan Transportation Study are described. The study, if established as a continuing responsibility as is now proposed, will analyze planning and traffic data, feed back transportation needs to traffic and highway engineers, transit companies, planners and others, and formulate policy. Other proposals for the Nashville study are that it continue as a division of an existing department, be established as a new department or be organized as an advisory body. Findings and recommendations of the Hershey Conference on Freeways in the Urban Setting are included. An appendix lists manuals prepared by the National Committee on Urban Transportation.

H-009

Haney, D.G.
USE OF TWO CONCEPTS OF THE VALUE OF TIME. In: Highway Economics, Highway Research Record, no. 12. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963. pp. 1-18.

The value of time, the factor used in converting the savings in travel time for the occupants of passenger cars, is used in examining the meaning and the importance of the willingness-to-pay concept. The use of the cost of time concept to make better decisions in analyzing alternative highway designs and locations is demonstrated. The factors used are: annual highway cost, annual user cost, and annual travel time for pasenger cars. The effect that the value of time has on benefit-cost ratios is shown. Factors of error are provided. The Cost of Time Procedure is compared with the Benefit-Cost Ratio Procedure. Because little is known about the actual willingness to pay, little confidence can be placed in converting travel time savings in hours to dollar values. The most immediately practical use of the Cost of Time procedure would be to estimate the maximum allowable cost of time, using data on last year's proposals and budgets.

H-010

Haning, Charles R. and C.V. Wootan.
VALUE OF COMMERCIAL MOTOR VEHICLE TIME SAVED. In: Freight Transportation. Highway Research Record, no. 82. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 54-76.

An attempt to determine the dollar value of time savings to commercial vehicle operators, in intercity and over-the-road operation, resulting from the use of improved highway facilities. Following a discussion of alternative approaches, the authors decided upon the net operating profit approach as the most appropriate. A detailed description of the methodology, data, equations and results are given. A consideration of the market area approach is also presented in which the value of time savings for a private commercial fleet is expressed mathematically, taking into account the utilization of time savings to effect operating cost economies while expanding the market area. This report is based on a study done for the Bureau of Public Roads. 15 references.

H-011

Hansen, H.W.
GUIDES FOR TRANSPORTATION PLANNING. Traffic Quarterly, vol. 16, April 1962, pp. 201-11.

A nationwide comprehensive transport study is proposed which would provide information on intercity movements of people and goods by all forms of transportation. Guidelines for this study are presented. Included are discussions of population and city growth, and urban travel patterns. Existing transportation studies are piecemeal and must be coordinated. General procedures for the national study are presented and discussed. It is primarily the trips having their origin and destinations in larger cities which establish the locations of major intercity travel corridors.

H-012

Harbaugh, K.H. and W.H.G. Fitzgerald
HYDROFOIL OPERATIONS AND DEVELOPMENT EXPERIENCE 1952-1964. Society of Naval Architects & Marine Engineers - Hydrofoil Symposium - Paper 2-h for meeting May 13-14, 1965.

Hydrofoil Operations and Development Experience 1952-1964, K.H.HARBAUGH, W.H.G.FITZGERALD. Soc Naval Architects & Mar Engrs—Hydrofoil Symposium—Paper 2-h for meeting May 13-14 1965 11 p. Utility of hydrofoil vessel, in marine speed range from 25 to 100 knots, for both military and commercial operations is illustrated on basis of data accumulated over 12 yr from operation of some 79 vessels designed by Supramar, using Schertel-Sachsenberg foil system; number of long, open sea cruises of these vessels are described; few incidents involving collisions of hydrofoil vessels with various objects are included; problems of maintenance and design modifications brought about by corrosion and erosion due to cavitation are indicated.

H-013

Harper, B.C.S. and H. M. Edwards.
GENERATION OF PERSON TRIPS BY AREAS WITHIN THE CENTRAL BUSINESS DISTRICT. In: Traffic Origin and Destination Studies; Appraisal of Methods. Highway Research Board Bulletin 253. National Research Council. National Academy of Sciences, Washington, D.C., 1960. pp. 44-61.

City planners say that the traffic which flows in and out of a city each day is generated by the buildings in the center. To verify this hypothesis and to see if floor-space forecasts could be used to predict travel to the central business district a study was made of floor space in use and travel to the central business district. Floor space in use in each destination zone was classified in three broad categories of retail, service (office and manufacturing), and warehousing. These figures were then considered as variables causing the difference in the number of persons shown by the origin-and destination survey to have a destination in the various zones. A statistical regression technique was used to determine any relationship between the variables. The relationship between floor space usage and the number of persons with destinations within a zone was found to be well developed. The mathematical relationship determined by regression analysis predicted the person destinations with less than 20% error. In zones of high attraction the error was within 2%. This was repeated in all the seven cities studied and the truth of the hypothesis seemed demonstrated. The extent of the error could probably be reduced by considering a larger number of floor-space variables or modifying the mathematical law slightly. The cities studied were metropolitan areas with populations of more than 250,000: Philadelphia, Detroit, Baltimore, Seattle, Vancouver, Tacoma, and Dallas. Great similarities existed among Philadelphia, Detroit, Baltimore, and Seattle. Tacoma seems to represent another group although the data available were limited and thus inconclusive.

H-014

Hassall, A.F.A.
HOVERCRAFT IN UNITED KINGDOM - REVIEW OF SIGNIFICANT EVENTS IN 1964 AND SOME LIKELY DEVELOPMENTS IN NEAR FUTURE. SAE-Paper 650220 for meeting Apr. 12-15, 1965, 5 p.

Hovercraft in United Kingdom—Review of Significant Events in 1964 and Some Likely Developments in Near Future, A.F.A. HASSALL. SAE—Paper 650220 for meeting Apr 12-15 1965 5 p.

In June, 1964, Westland Aircraft, Ltd, ran trials on SR-N5 vehicle; specification data of SR-N4 and SR-N5; vehicles likely to be used on proposed commercial ferry operation across Solent estuary between mainland and Isle of Wight, will be SR-N4 or VA-4; future development concerns land version of Hovercraft, running on prepared track, for rapid intercity transport; possible configuration of vehicle and proposed method of propelling by linear electric motor; study of economic estimates for 150-seat, diesel powered, tracked Hovercraft and findings obtained.

H-015

Hatry, Harry P. and J. F. Cotton.
PROGRAM PLANNING FOR STATE, COUNTY, CITY. State-Local Finances Project, George Washington University, Washington, D.C., January, 1967. 72 pp.

In recent years a substantial movement has emerged which gives some promise of more rational decision-making in government programs. Since the early 1960's the Department of Defense has been experimenting with planning techniques designed to improve the effectiveness of programs in pursuit of the Department's missions. In the fall of 1965 the President directed most federal departments and agencies to apply the same system of Planning-Programming-Budgeting (PPB) to their programs. States and localities are turning to an exploration of the feasibility of PPB at state and community levels. In the light of this interest the present monograph was prepared. Part One describes a programming, planning, budgeting system. Part Two presents the logic program evaluation. Its mathematical formulation is not meant to propose formulas that could directly be used for computing the best possible programs and program combinations. It rather is designed to present the mental processes through which the analyst has to go in order to provide to the decision-makers relevant information in quantifiable form.

H-016

Hawkins, W.M.
NEXT 50 YEARS IN AVIATION. Astronautics & Aeronautics, vol. 3, no. 7, July 1965, pp. 90-9.

Next 50 Years in Aviation, W.M.HAWKINS. Astronautics & Aeronautics v 3 n 7 July 1965 p 90-9. Attempt is made to appraise economical and technological environment to be expected with respect to aviation; growth areas for short-range aviation, domestic and international travel are estimated and possible aircraft configurations ranging from economical VTOL, SST, 500-passenger and semiballistic aircraft are projected.

H-017

Heanue, K.E. and C.E. Pyers.
A COMPARATIVE EVALUATION OF TRIP DISTRIBUTION PROCEDURES. Public Roads, vol. 34, no. 2, June 1966, pp. 43-51.

The results of a research project designed to test, evaluate, and compare four major trip distribution techniques are presented. These techniques are the Fratar growth factor procedure; the gravity model; the intervening opportunities model developed by Morton Schneider of the Chicago Area Transportation Study; and the competing opportunities model suggested by Anthony Tomazinis of the Penn-Jersey Transportation Study. An attempt has been made to give the potential user of trip distribution models insight into the theoretical differences underlying them as well as knowledge of their advantages and disadvantages in a practical application. The validity of these models as forecasting tools is also presented.

H-018

Heathington, Kenneth W. and P.R. Tutt.
TRAFFIC VOLUME ANALYSIS OF URGAN FREEWAYS. Departmental Research Report no. SS 5. 0, App. 1, Texas Highway Department (Austin, Texas 78701) Sept. 1966, 106 pp.

To design and to evaluate the traffic movement on any section of freeway, highway, or arterial street, it is necessary to determine a traffic volume for a number of specific periods of time. In 1963, traffic volumes in 5-min intervals were manually recorded at nineteen urban locations in six Texas cities. In 1965, traffic volumes in 5-min. intervals were recorded with traffic actuated equipment at fifteen urban locations in six Texas cities. From the 1963 and 1965 data, a method to predict the peak-hour volume in the inbound direction from the 24-hr. traffic volume has been developed. The distribution by lane of the directional volumes for each 5-min. interval is graphically displayed. The results of the analysis of the 1965 data generally show good correlation in the development of expansion factors for the locations under study. It is evident from the data presented that traffic counts of short duration can be used to estimate the traffic volumes for longer-time intervals, the resulting volumes being well within the limits necessary for design purposes.

H-019

Heinemann, E.H.
AVIATION IN PERSPECTIVE. Roy Aeronautical Soc.-J., vol. 69, no. 650, Feb. 1965, pp. 85-95.

Aviation in Perspective, E.H.HEINEMANN. Roy Aeronautical Soc—J v 69 n 650 Feb 1965 p 85-95. Past progress is examined to establish base for projections into future; aircraft are classified into VTOL-STOL, conventional propeller-driven, subsonic and supersonic jets, and development possibilities for each group are indicated; aircraft under development and construction in various divisions of General Dynamics Corp are described to demonstrate aircraft types required across complete spectrum of performance; models are either under prototype development, production or modification; evolutionary approach to suborbiting craft employing suborbiting or momentum principles; possible arrangement is shown.

H-020

Hemmens, George C.
THE STRUCTURE OF URBAN ACTIVITY LINKAGE. Center for Urban and Regional Studies. Institute for Research in Social Science, University of North Carolina, Chapel Hill, N.C., 1966.

H-021

Hewitt, Otha
COST ANALYSIS OF METHODS FOR INTERSTATE GUIDE SIGN MAINTENANCE. In: Highway Research News no. 21. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., Nov. 1965. pp. 48-58.

Interstate guide signs measuring 10 to 15 feet high and 15 to 20 feet long are not uncommon. Their maintenance is the responsibility of state highway departments. Two methods have been compared: the conventional method in which the panels are chemically stripped and reused and an overlay method employing new techniques designed specifically for the large signs of the Interstate System. The steps in the conventional method are given in detail, as are those for the overlay method. There are illustrations of the work. It was found that the conventional method cost from 18-40% more than the overlay method depending on the wage scale and the original backing used. The overlay method required only 58% of the time required for the conventional method and was done without stripping, degreasing and etching tanks. Where there has been substantial damage (bullet holes, rock dents) the overlay method does not require panel replacement while the conventional method does.

H-022

Hiatt, M.A. and K.C. Plewes
CONVERTIBLE PLANE TO CARRY PEOPLE BY DAY, CARGO BY NIGHT. SAE Journal, vol. 74, July 1966, pp. 58-9.

H-023

Highway Research Board
ADMINISTRATIVE STRUCTURE OF LOCAL RURAL ROAD ORGANIZATIONS. Highway Research Board Special Report 37. National Research Council. National Academy of Sciences, Washington, D.C., 1958, pp. 29-30.

Information on the administrative structure of such bodies in Pennsylvania are reproduced is the annexed table:

Pennsylvania

1. Unit:

County
Second class township
Other local governmental units in Pennsylvania are considered as urban.

2. Policy-making board:

Board of county commissioners
Board of township supervisors

(Continued page 94)

3. Number of members on board:

Board of county commissioners - three
Board of township supervisors - three

4. How members are selected:

Board of county commissioners - elected at large by the qualified electors of the county.
Board of township supervisors - elected at large by the qualified electors of the township.

5. Term of office:

Board of county commissioners - four years
Board of township supervisors - six years, staggered, one member being elected every two years.

6. Manager and method of selection: The rural road function in Pennsylvania is principally an obligation of the second class townships. Boards of county commissioners, in some counties, control roads designated county roads, and may appoint a county road caretaker to inspect and repair such roads. Boards of county commissioners may appoint, to serve at their pleasure, a professional civil engineer to be titled county engineer, to prepare plans, specifications and estimates of all engineering work undertaken by the county.

The board of township supervisors is required to divide the township into one or more road districts, and to employ a superintendent for the entire township or a roadmaster for each district. This requirement does not prohibit the township supervisors from being employed as superintendents or roadmasters, or as laborers. Two or more townships may appoint the same person as superintendent.

The board of township supervisors may, at any time, appoint a township engineer who shall be a registered professional engineer to perform such duties as prescribed as to the construction, reconstruction, maintenance, and repair of all streets, roads, pavements, sewers, bridges, culverts and other engineering work.

7. Division of duties and responsibilities: Boards of county commissioners may locate, construct, reconstruct, widen, replace, remove and in all respects provide for bridges and viaducts and the approaches thereto, over streams and other impediments to public traffic, except such structures belonging to cities, boroughs, and the state highway system.

Boards of county commissioners, may upon approval by the Court of Quarter Sessions, originally lay out and open roads, take possession of, and exercise control over, any existing township road or part thereof, and build and maintain roads as county roads within their respective limits. Bridges, other structures, and roads thus constructed by the board of county commissioners, or subject to their control, must be maintained by the county or the county must make arrangements with local political subdivisions to do the maintenance work.

The board of township supervisors, or the supervisors acting as superintendents or roadmasters, are charged with the general care and superintendence of the improvement of roads and bridges in the township. The duties and authority of appointed superintendents are regulated by the appointing officials at whose pleasure they serve.

H-024

Highway Research Board.
AUTOMOBILE PARKING; SELECTED REFERENCES, 1962-1964. Highway Research Board Bibliography 37. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

380 annotated entries on all facets of parking. Includes author, subject and geographical indexes.

H-025

Highway Research Board
COMPONENT ELEMENTS OF THE PLANNING PROCESS. Highway Research Record, no. 137. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966.

H-026

Highway Research Board
CONSEQUENCES OF HIGHWAY IMPROVEMENT. Highway Research Record, no. 16. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963.

Five reports on: the economic impact of secondary road developments, the relation of highway accessibility to urban real estate values, area development and highway transportation, parkways, values and development in the Washington metropolitan region, and highway development in relation to community attitudes and organization.

H-027

Highway Research Board.
ECONOMIC FORECASTING. Highway Research Record, no. 106. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966.

Six papers dealing with transportation problems of urban areas. Two of the papers deal with highway incomes, expenditures, and user-taxes; and with residential location and urban mobility. The remaining four have been abstracted and appear in the Bibliography under B-027, B-029, K-001, and S-039.

H-028

Highway Research Board.
EFFECT OF CONTROL DEVICES ON TRAFFIC OPERATIONS; INTERIM REPORT. National Cooperative Highway Research Program Report 11. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964.

Describes the parameters employed in studies in the Chicago area to determine the effects of stop- and yield-sign installations. They include speed, volume, gap and lag acceptance, travel time and delay, safety, headway distribution, route choice, and driver actions. The paper is divided into two parts: individual and adjacent intersection operation; and operation along a traffic corridor. The evaluation of the parameters for individual intersections, the measurable effects from control on adjacent intersections, and travel route pattern changes that developed from the new installation or change in type of traffic control device are discussed. Traffic simulation on electronic computers is reviewed.

H-029

Highway Research Board.
ENGINEERING ECONOMY 1963. Highway Research Record, no. 77. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

The first paper emphasizes the need for up-to-date studies of running costs for the use of highway engineering economy studies. Detailed discussion of fuel consumption, tire tread wear, engine oil consumption, maintenance and repair, and depreciation as related to vehicle design and speed changes as well as to highway design factors. Specific data are given for a passenger car and for a diesel semi-trailer. The other papers have been abstracted, and appear in the bibliography under C-028, M-038, and R-008.

H-030

Highway Research Board.
FORMULATING HIGHWAY CONSTRUCTION PROGRAMS. Workshop Conference Proceedings, Sept. 19-20, 1960. Highway Research Board Special Report 62. National Research Council. National Academy of Sciences, Washington, D.C., 1961.

After a discussion of the general problems in formulating highway construction programs, there are papers on specific aspects of investment planning (scheduling capital improvements; the legislative role, information needed for planning, accounting and budgets; priority analyses and project selection; scheduling of specific projects; law, administration, and public relations) and a summary and case study. Included are a glossary and a bibliography. Of the 16 papers 5 have been abstracted and appear in the bibliography under B-001, C-003, D-010, E-005, and H-098.

H-031

Highway Research Board.
FREEWAY CHARACTERISTICS, OPERATIONS AND ACCIDENTS. Highway Research Record, no. 99. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C. 1965.

The eleven papers presented are concerned with the traffic characteristics and the operational aspects of freeways. Traffic volume and capacity, mathematical traffic flow theory, traffic capacity and characteristics for on-ramp and off-ramp operation, and planning peak period surveillance and control on freeways are among the topics discussed. One of the papers has been abstracted and appears in the Bibliography under W-008.

H-032

Highway Research Board.
FREEWAY OPERATIONS. Highway Research Board Bulletin 324. National Research Council. National Academy of Sciences, Washington, D.C., 1962.

Five papers are presented: predicting the effectiveness of highway signs; the Squirrel Hill Tunnel (Pittsburgh) traffic operations study; an operational study of signalized diamond interchanges (Fort Worth); and the collection and processing of traffic flow data by machine methods.

H-033

Highway Research Board.
FREEWAY OPERATIONS. Highway Research Record, no. 21. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963.

The technology of freeway operation is discussed with special reference to left-hand exits, traffic behavior and off-ramp design, the influence of on-ramp spacing on traffic flow, the pilot detection system of the Congress Street Expressway, traffic surveillance and control, and the effect of an expressway (Northwest in Chicago) on alternate arterial streets. One of the papers has been abstracted and will be found in this bibliography under F-009.

H-034

Highway Research Board.
FREIGHT TRANSPORTATION. Highway Research Record, no. 82. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

Contains nine reports on statistics on waterborne commerce; trucking data from the 1963 Census of Transportation; highway ton-mile data; obtaining quality data from carload waybills and other samples. The five other reports have been abstracted and appear separately in the Bibliography under H-010, H-102, K-003, M-006, and N-016.

H-035

Highway Research Board.
FREIGHT TRANSPORTATION ECONOMICS. Highway Research Record, no. 175. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967. 32 pp.

4 papers on freight transportation economics dealing with information derived from census material on freight shipments and patterns, the methodology and information from the Southwestern Regional Continuous Traffic Study, and an analysis of the importance of transportation in the overall economy. Two of the papers have been abstracted and appear in this bibliography under C-014 and R-003.

H-036

Highway Research Board
FRONTIERS OF RESEARCH IN HIGHWAY LAW, 1963-1964. Highway Research Record, no. 78. Highway Research Board. National Research Council, National Academy of Sciences, Washington, D.C., 1965.

Papers on current problems concerning legal procedures by which highway programs are carried out. The first four deal with planning, construction and operation of highway systems - eminent domain, the police power, contracts, and intergovernmental relationships. The next four are concerned with use of air space in connection with highway transportation, defining the function of the legal doctrine of sovereign immunity, correlating laws relating to highways and laws relating to drainage, etc. Extensive legal citations are given in several of the papers.

H-037

Highway Research Board
HIGHWAY ADMINISTRATION. Highway Research Board Bibliography 19. National Research Council. National Academy of Sciences, Washington, D.C., 1957.

A bibliography of 362 entries. Author and subject indexes are provided.

H-038

Highway Research Board.
HIGHWAY AND INTERCHANGE CAPACITY. Highway Research Record, no. 27. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963.

Reports on the operation of expressways are given. "Traffic operation at two interchanges in California" describes the specific application to two problem situations of a continuing study whose purpose is to achieve better design in future freeways. One problem area involved a cloverleaf-type interchange without collector roads where weaving was a problem, the other was a major bottleneck at an on-ramp. Another study from California discusses capacity on rural and urban freeways. Freeway ramp capacity is studied in a third paper. Traffic flow characteristics are investigated in a fourth paper in relation to the goal of reducing or eliminating traffic congestion. A study of four-way stop intersections is reported: One of the papers, dealing with 30th peak hour factor trend, has been abstracted and appears in the Bibliography under B-016.

H-039

Highway Research Board
HIGHWAY CAPACITY MANUAL 1965. Highway Research Board Special Report 87. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

A practical manual for determining Highway capacity including: highway design, traffic control and operations, traffic flow, and traffic measurements.

H-040

Highway Research Board
HIGHWAY CORRIDOR PLANNING AND LAND ACQUISITION. Highway Research Record, no. 166. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967.

9 papers which deal with: the highway corridor as a planning and design concept, the problems involved in implementing corridor plans by legal techniques, application of the corridor concept to a nationwide system of scenic highways, the highway corridor and intergovernmental cooperation, the transportation system corridor, the implementation of the corridor concept through eminent domain, acquisitions of scenic easements, and elimination of roadside advertising signs and junkyards.

H-041

Highway Research Board
HIGHWAY ECONOMICS. Highway Research Record, no. 12. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963.

Seven reports on: the effect of highway improvement on travel time, concepts of the value of time, direct costs and frequencies of motor-vehicle accidents, benefit-cost ratios, the annual cost of highways, programing highway accident reduction, and an economic replacement model for highway surfaces. Five of these reports have been abstracted and appear in the bibliography under F-005, H-009, J-006, S-014, and W-019.

H-042

Highway Research Board
HIGHWAY FINANCE AND BENEFITS. Highway Research Record, no. 138. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966.

H-043

Highway Research Board.
HIGHWAY FINANCE: SELECTED REFERENCES, 1950-1953. Highway Research Board Bibliography 16. National Research Council. National Academy of Sciences, Washington, D.C., 1954.

Contains 484 references on such specific topics as: Highway taxation, expenditures, borrowing for highways, financial programs and plans and statistics.

H-044

Highway Research Board
HIGHWAY FINANCING. Highway Research Record, no. 20. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963.

Ten reports on: highway bond financing, special assessment financing of major highway improvements, selection of a county distribution formula for state road assistance in Mississippi, model for funds allocation for urban highway systems capacity improvements, the place of subsidies in an optimum transportation system, nonuser revenues, and benefits, road test findings applied to state highway cost allocation studies, applications of earnings-credit and relative-use methods of highway cost allocation.

H-045

Highway Research Board.
HIGHWAY LAW COMMENT. Highway Research Circular, no. 66. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., July 1967.

Highway Law Comment is compiled by the Department of Legal Studies of the Highway Research Board. This specific issue contains articles on the effects of disclosure of information relating to subsurface conditions, a review of recent cases on the duty of disclosure of information to contract bidders, and a summary of Wisconsin's legislative problems in its scenic easement program. There are also bibliographical notes on recent legal periodical writings and papers. These citations are arranged by category; access rights, air space, contracts, eminent domain, highways and streets, inverse condemnation, scenic roads development, tort liability, and zoning and land use controls.

H-046

Highway Research Board.
HIGHWAY NEEDS AND PROGRAMMING PRIORITIES. Highway Research Board Bulletin 249. National Research Council. National Academy of Sciences, Washington, D.C., 1960.

Contains four articles on: a congestion approach to rational programming, advance programming methods, highway expenditures programming, estimation of primary road needs. Two of the papers have been abstracted and appear in this bibliography under G-003 and G-012.

H-047

Highway Research Board.
HIGHWAY PROGRAMMING: AN ANALYSIS OF STATE LAW. Highway Research Board Special Report 70. National Research Council. National Academy of Sciences, Washington, D.C., 1962.

An analysis and summary of various state laws on long-range highway programs, annual programs, financing and programming, budgets and programming, reports, determination of future highway needs, project priorities, and intergovernmental cooperation. Highway programming legislation was found in only a few states, and the existing legislation was examined. The most direct legislative support for highway programming was found in laws authorizing long-range highway programs. In Pennsylvania, a Highway Planning Commission was created in 1949 to develop a long range highway program. Most states provided general authority to establish current and long-range highway programs with the highway department preparing annual construction programs with project priorities. A summary of findings in the states is provided as well as an introduction to highway programming. The appendix contains a summary of statutes by state.

H-048

Highway Research Board.
HIGHWAY RESEARCH BOARD PUBLICATIONS. JANUARY 1967. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967.

Each available publication is listed twice: first by subject and then by the Highway Research Board publication series of which it is a part. Subjects covered include: accidents, administration and management, aggregates, bases and subbases, bituminous materials and mixtures, traffic (general), urban transportation research (general) and vehicles. The prices are given. A basic guide to basic material.

H-049

Highway Research Board.
HIGHWAY RESEARCH NEWS. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., Spring 1967.

Highway Research News is now published quarterly. It contains profiles on persons prominent in the field; news on research through the National Cooperative Highway Research Program (NCHRP) and other domestic and foreign groups. Each issue contains two feature articles on new techniques, equipment, etc. Book reviews are presented and new HRB publications listed.

H-050

Highway Research Board.
HIGHWAY RESEARCH NEWS, no. 13. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., June 1964.

Eight articles on accident reports; relationships between traffic volume, median width, and accident frequency; studies of medians; evaluation of improvement projects; computer methods for traffic count analysis; systems analysis approach to processing of vehicular traffic records from continuous-count stations and grading and rock problems encountered during a railway relocation. Three of these have been abstracted, and appear in the bibliography under H-110, P-023, and P-031.

H-051

Highway Research Board

HIGHWAY RESEARCH NEWS no. 15. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., November, 1964.

In addition to reports of constituent committees on such areas as maintenance costs; the durability of concrete; coating, sign and marking materials; this and earlier issues of the publication contain summaries of court decisions in the general area of land acquisition for road building and ancillary purposes.

H-052

Highway Research Board.

HIGHWAY SAFETY 1963 AND 1964. Highway Research Record, no. 79. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

The causes and characteristics of single-car accidents in which reports of about 5,200 cases were analyzed are described in one paper. Personality and biographical variables in relation to driving item response, the totally deaf driver, methods of determining high-accident locations, hazard-reducing improvements, safe design, and adapting the highway to the human element are subjects discussed in further reports. Of the nine papers one has been abstracted and appears in this bibliography under A-004.

H-053

Highway Research Board
HIGHWAY SYSTEM CLASSIFICATION; A LEGAL ANALYSIS. Part 1
Highway Research Board Special Report 42. National Research Council. National Academy of Sciences, Washington, D.C., 1959.

A legal guide for states re the objectives and nature of a primary highway system. The need for functional traffic systems is discussed with the state highway department suggested as the administrative body. Legislatures may be more responsive to state needs than highway departments and a combination of the two appears desirable. If a state proposes to revise its highway classification law, the following elements should be considered: declaration of legislative purpose for interpreting statues; separability or severability clause for protection against total invalidation; definition of terms to avoid ambiguity; statement of objectives, designation of a system or reclassification of a system; provision for additions or deletions to the primary highway system; contraction of system size when no specific legal authority exists for doing so; reference to municipal connecting links. Pennsylvania practice on methods of making changes is shown in the summary below.

PENNSYLVANIA

Statutes

Primary highway system composed of main-traveled highways authorized by law, and connecting county seats and principal municipalities. Additions made by Legislature but Department of Highways may lengthen or shorten routes to provide connections with other State highways. Department may make revisions in the interest of safety and subject to approval of Governor. Deletions generally by Legislature but Department may delete sections superseded by relocation. Superseded sections not over 2.5 miles in length in townships, boroughs or incorporated towns may be closed if not necessary for public travel, subject to approval of Governor. Municipal connecting links designated by Legislature. Department may alter routes in cities of first class, second class, second class A and third class with approval of Governor. May delete routes, with approval of Governor, in townships, boroughs and incorporated towns.

Judicial Decision

Petition of Turkey Run Fuels, Inc., 173 Pa. Super. 76, 95 A.2d 370 (1953), held Court of Quarter Sessions might vacate "State roads" when they no longer form part of a "State highway."

H-054

Highway Research Board
HIGHWAY SYSTEM CLASSIFICATION; A LEGAL ANALYSIS. Part 2. Highway Research Board Special Report 85. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

A report on the statutory provisions for the secondary state highway systems under the control of the state highway departments; the highway systems under control of political subdivisions of the state; and municipal systems. The highway classification system of statutory authority for the states is given together with the prevailing patterns. A resolution adopted by the Pennsylvania legislature in 1963 provides for creation of a highway classification committee to study the functional uses of state and local highway systems. The well-defined relationship existing between Federal-aid primary system and the State primary systems is noted. The advantages in the separation of state roads into primary and secondary categories are discussed. The advantages and disadvantages of a secondary highway classification are reported, together with means of designation, objectives, additions and changes, and municipal extensions of the secondary highway system. Local rural and municipal highway systems are similarly treated. Appendices include: summary of statues pertaining to classification of highways below the primary state level and drafting guide for comprehensive highway system classification legislation.

H-055

Highway Research Board.
HIGHWAYS AND ENVIRONMENTAL QUALITY. Highway Research Record, no. 182. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C.,1967.

Six papers concerning the aesthetics of highway transportation are presented. Papers include information on providing desirable scenery as viewed from the highway, a procedure for evaluating the relative visual quality of specific segments of highways, research on perceptions of highway environmental quality, methods of estimating benefits from scenic enhancement of highways, costs and feasibility of the Highway Beautification Act of 1965, and legal measures for preserving scenic beauty along transportation corridors.

H-056

Highway Research Board.
INDIRECT EFFECTS OF HIGHWAY IMPROVEMENT: 1962 Highway Research Board Bulletin 327. National Research Council. National Academy of Sciences, Washington, D.C., 1962.

A series of five papers. Two of these deal with land-use planning and the interchange community, and highway location and economic development. The remaining three have been abstracted and appear in this Bibliography under L-021, S-041 and T-003.

H-057

Highway Research Board.
INDIRECT EFFECTS OF HIGHWAY LOCATION AND IMPROVEMENTS. Highway Research Record, no. 96. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

Contains five reports on the influence that highway improvements have on adjacent areas, particularly with respect to the land value impact of highways. Community consequences and response to highway improvement, commercial highway service districts, and highway interchange area development are covered. All five reports have been abstracted and appear under A-077, F-004, H-106, M-017, and T-002.

H-058

Highway Research Board.
INTERGOVERNMENTAL COOPERATION IN HIGHWAY AFFAIRS: A RECOMMENDED ACTION PROGRAM FOR EFFECTIVE RELATIONSHIPS. Highway Research Board Special Report 9. National Research Council. National Academy of Sciences, Washington, D.C., 1953.

Recommendations mutually agreed upon by the members of the Advisory Committee for the Cooperative Project on Intergovernmental Relationships in Highway Affairs are discussed. These recommendations include the areas of: highway classification, uniform standards, planning and programing, organization and management, and authority and responsibility. If efficient highway administration and good relationships are to exist, each of these functions must be clearly defined and assigned to a particular level of government. The functions in each area of highway administration that should be performed by local, state, and federal agencies are described.

H-059

Highway Research Board.
A KEY TO CHANGE: URBAN TRANSPORTATION RESEARCH. Highway Research Board Special Report 69. National Research Council. National Academy of Sciences, Washington, D.C., 1962.

Panel discussions on such aspects of the subject as changing land use patterns, human values related to urban transportation, economic development, political factors and administration and financing of urban transportation. Thirteen research proposals were made in the above fields and are indexed by subject at the end.

H-060

Highway Research Board
LAND ACQUISITION 1963. Highway Research Record, no. 54. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D. C., 1964.

Nine reports on highway land acquisition, application of the critical path method to a highway right-of-way operation, highway condemnation law, highway severance damage studies, community effects on remainder parcel valuation, and a computer technique for calculating costs of right-of-way. One report has been abstracted and appears in the Bibliography under B-026.

H-061

Highway Research Board.
LAW OF TURNPIKES AND TOLL BRIDGES. Highway Research Board Special Report 83. National Research Council. National Academy of Sciences, Washington, D.C., 1964.

Contains a consideration of Federal authority and State authorization legislation on the subject. Organization, powers and duties as well as financing, debt limitations, bond provisions, interest rates, etc. of toll authorities are included. Miscellaneous major provisions such as property damage and personal injury, conflict of interest, and regulation of toll facility use are cited. It also contains 4 Appendixes (sections for Pennsylvania are reproduced below) including: tables on certain provisions of state laws; cases and federal statutes; a selected bibliography; and a list of major toll highways in the United States as of October, 1963.

Table 1. State Toll Facilities Legislation Analysis: General Authorization (continued)

State	Legislative Citation	Basic Purpose	Declaration of Policy	Authorization and Procedural Matters	Definitions
Ohio (cont'd) (3)	§§5593.01 to 5593.19	General; bridges or partially constructed bridges or toll bridges over rivers and navigable waters forming a city or county boundary or whose approaches extend within boundary (any city or county bridge commission)		Same as above, but may construct bridges and issue bridge revenue bonds of the State, county, or city.	Same as above
Okla. (1)	Okla. Stats. 1951, tit. 69, §§651 to 695	Specific. (1) Turnpike between Oklahoma City and Tulsa, (2) Oklahoma part of turnpike between Oklahoma City and Wichita Falls, Texas; (3) the Northeastern (Will Rogers) Turnpike; (4) a turnpike, or part or parts, from Oklahoma-Texas line east of Norman and Oklahoma City to Turner Turnpike and Arkansas River, then toward Texas border (Oklahoma Turnpike Authority)	To provide modern express highways with every safety device; to facilitate vehicular traffic; to remove handicaps and hazards on congested highways, to increase commerce and prosperity, and to improve health and living conditions, thereby performing an essential State governmental function	Authorized to construct, maintain, repair, and operate above specific turnpike projects, and others when authorized by Legislature; to issue turnpike revenue bonds of the authority to pay all or part of the cost and to apply to the Supreme Court of the State for approval of issuance; to carry liability insurance; collect tolls; and do other necessary things, with certain construction contract restrictions.	"Authority," "project" or "turnpike project," "cost," "owner," and "business for profit"
(2)	tit. 69, §§111 to 124	General, any interstate toll bridge or toll bridge connecting State highway system (State Highway Commission)		Authorized to acquire for State any such bridge; to maintain, repair, and operate it; and to issue bridge revenue bonds and to collect tolls only until bonds paid.	
(3)	tit. 69, §§391 to 397	General; any toll bridge in any county (Board of County Commissioners)		Authorized to acquire by purchase out of its road and bridge fund, by bond issue, or by condemnation such toll bridges for the county for toll-free use.	
Pa. (1)	Purdon's Pa. Stats. Ann., tit. 36, §§652a to 652u; 654.1 to 654.3, 659.1 to 659.7	Specific. At such locations as shall be approved by the Department of Highways, from a point at or near Middlesex in Cumberland County to a point at or near Irwin in Westmoreland County (Pennsylvania Turnpike Commission)	To provide for the construction of the Pennsylvania Turnpike in order to facilitate vehicular traffic between the eastern and western sections of the Commonwealth; to promote the health, safety, and welfare of the citizens, both in peace time and emergencies, by widening it, to improve commerce and prosperity and provide for the general welfare, thereby performing an essential governmental function	To construct, operate, and maintain a turnpike with connecting tunnels and bridges, to widen it to four lanes and/or construct additional tunnels; and to issue turnpike revenue bonds to pay the cost and to collect tolls.	"Commission," "owner," "the turnpike," "cost of the turnpike," "Turnpike," "Eastern Extension," "Western Extension," "Delaware River Extension," "project," "Pennsylvania Turnpike System," a "cost"
(2)	§§653 to 653s; 654.1 to 654.3; 659.1 to 659.7	Specific. Pennsylvania Turnpike Philadelphia Extension (Eastern Extension) extending from a point at or near Middlesex in Cumberland County to a point at Philadelphia, location to be approved by governor and Department of Highways	To facilitate vehicular traffic between the eastern and western sections	To construct, operate, and maintain an eastern extension to the turnpike with connecting roads, tunnels, and bridges; to issue turnpike revenue bonds to pay cost, and to collect tolls.	See above
(3)	§§654 to 654r; 654.1 to 654.3; 659.1 to 659.7	Specific. Western Pennsylvania Turnpike Extension, extending from a point at or near Irwin in Westmoreland County to a point at western boundary line of Pa., touching on Ohio or W. Va., location to be approved by governor and Department of Highways	See above	To construct, operate, and maintain a western extension to the turnpike, to combine the turnpike and the eastern and western extensions, or any two, for financing purposes and fix and revise tolls for projects so combined; to issue revenue bonds of the Commonwealth, and to collect tolls.	See above
(4)	§§659.1 to 659.7, 660.1 to 660.20	Specific. Pennsylvania Turnpike System Northeastern Extension, extending from a connection with Turnpike at a point east of Susquehanna River to a point on or near the Pa.-N.Y. line, between the Susquehanna and Delaware Rivers at Sayre, with connections to Susquehanna and Delaware Rivers, location to be approved by governor and Department of Highways	To facilitate vehicular traffic across the State, and to provide additional traffic facilities to the industrial communities in the northeastern section	To construct, operate, and maintain a northeastern extension to the Pennsylvania Turnpike System, to issue turnpike revenue bonds of the Commonwealth and to collect tolls.	See above

Table 1. State Toll Facilities Legislation Analysis: General Authorization (continued)

State	Legislative Citation	Basic Purpose	Declaration of Policy	Authorization and Procedural Matters	Definitions
Pa. (cont'd) (5)	§§659.1 to 659.7; 664.1 to 664.20	Specific. Pennsylvania Turnpike System Gettysburg Extension, extending from a connection with the System at a point west of Susquehanna River to Pa.-Md. line, in vicinity of Gettysburg; location to be approved by governor and Department of Highways	To facilitate vehicular traffic in southeastern Pennsylvania	To construct, operate, and maintain an extension to the Turnpike System in southeastern Pennsylvania; to issue turnpike revenue bonds, notes, or other obligations payable solely from revenues, or any funds available to the Commission; and to collect tolls	See above
(6)	§§658.1 to 658.20, 659.1 to 659.7	Specific. Pennsylvania Turnpike Delaware River Extension, extending from a bridge to New Jersey to Eastern System Extension, location to be approved by governor and Department of Highways	To facilitate vehicular traffic across the Commonwealth	Commission authorized to acquire as turnpike cost the use, operation, and maintenance, for itself or jointly with any like body, a bridge to New Jersey; or to construct, operate, and maintain such bridge alone or jointly with the New Jersey Turnpike Authority; or to contract therewith for its construction, operation, and maintenance; to connect such bridge with the Pa. Turnpike System by constructing, operating, and maintaining an extension from its Eastern Extension, to issue turnpike revenue bonds, notes, or other obligations payable solely from revenues, including tolls, or any funds available to commission, and to collect tolls and other charges	See above
(7)	§§652.1 to 652.20	Specific, Pennsylvania Turnpike Philadelphia Loop Extension, extending in a northerly direction from a point near Chester to connect with the Pa. Turnpike System	To facilitate vehicular traffic in southeastern Pennsylvania	To construct (as a whole at one time or in sections from time to time) operate, and maintain a toll extension to connect with the Pennsylvania Turnpike System, with connecting roads, tunnels, and bridges; to acquire all property and rights necessary thereto, to issue revenue bonds, notes, and other obligations payable solely from commission revenues or other available commission funds to finance construction; and to collect tolls	See above
(8)	§§666.1 to 666.19	Specific; Pennsylvania Turnpike Keystone Shortway, extending from or near Sharon in Mercer County to or near Stroudsburg in Monroe County	To facilitate vehicular traffic in central Pennsylvania	Same as above	See above
(9)	§§668.1 to 668.19	Specific; Northwestern Extension, from Erie in Erie County, southerly to connect with the Pa. Turnpike System, including a lateral eastward extension westward to the Pennsylvania-Ohio boundary	To facilitate vehicular traffic in west and northwest Pennsylvania	Same as above	See above
(10)	§§669.1 to 669.19	Specific; Southwestern Extension, from Pittsburgh southerly to the West Virginia border to connect with the West Virginia Turnpike or extension	To facilitate vehicular traffic in southwestern Pennsylvania	Same as above	See above
(11)	§§655.1 to 655.17	Specific. Pocono Mountain Memorial Parkway, from a point at or near Delaware Water Gap to a point at or near Milford in Pike County, as located by Department of Highways (Pennsylvania Parkway Commission)	Parkway to be planned to avoid congested areas and designed to serve primarily tourist traffic and passenger vehicles; to be constructed wherever possible over and through forest, game, or fish lands and to be dedicated as a memorial to sons and daughters of Pennsylvania who served in World Wars I and II	Pennsylvania Parkway Commission is authorized to construct, operate, and maintain a parkway, together with connecting tunnels and bridges; to issue parkway revenue bonds payable solely from tolls and to collect tolls	"Commission," "bonds," "parkway," and "cost of parkway"
R. I. (1)	Gen. Laws of R. I. 1956, §§24-12-1 to 24-12-47	Specific. A turnpike from a point at or near the Conn.-R.I. border to a point at or near Tiverton, to Jamestown Bridge; Newport Bridge, Mount Hope Bridge and additional facilities (Rhode Island Turnpike and Bridge Authority)	To facilitate vehicular traffic, remove handicaps and hazards on congested highways, and promote the agricultural and industrial development of the State	Authority authorized to construct Newport Bridge and the turnpike, to acquire the Jamestown Bridge and the Mount Hope Bridge, to maintain, repair, and operate them, to issue its revenue bonds; to fix and collect tolls on each; and do necessary things	"Authority," "Newport Bridge," "Jamestown Bridge," "turnpike," "ferry franchise," "additional facility," "project," "cost," and "owner"

Table 2. State Toll Facilities Legislation Analysis: Administration (continued)

State	Name	Membership	Terms	Quorum	Bond	Salary
N. Y. (cont'd) (2)	New York State Thruway Authority, a public corporation, to exist so long as it has obligations outstanding and until terminated by law.	Three members, including chairman, appointed by governor with consent of senate.	Originally appointed for varying terms; successors to serve staggered nine year terms.	Majority		Reimbursement for actual expenses and $19,000 per year for chairman, other members $17,000
(3)	Jones Beach State Parkway Authority, a public benefit corporation.	Composed of commissioners of Long Island State Park Commission; if commission shall cease to exist, board shall consist of three members appointed by governor with consent of senate.	Six years	Majority of members then in office		No compensation; to be reimbursed for expenses
(4)	Triborough Bridge and Tunnel Authority, a public benefit corporation, successor to New York City Tunnel Authority.	Board composed of three members appointed by mayor who names chairman and fills vacancies for unexpired term and may remove any member for cause, after hearing or opportunity. Board may delegate powers and duties.	Six years	Majority		No compensation; actual expenses reimbursable
(5)	New York State Bridge Authority	Five members appointed by governor with consent of senate. Vacancies for unexpired term filled in same manner. Board shall choose from its members a chairman.	Staggered five year terms			No compensation, reimbursed for expenses
(6)	Ogdensburg Bridge and Port Authority	Nine members appointed by governor with consent of senate. Vacancies filled for unexpired term by governor. Board shall annually elect a chairman, vice-chairman, secretary, and treasurer.	Five members to serve staggered five year terms, remaining four to serve until Jan. 1, 1965; all to serve until qualification of successor.	Majority then in office		No compensation; expenses reimbursable
Ohio (1)	Ohio Turnpike Commission	Four members, appointed by governor, with advice and consent of senate, no more than two of whom shall be members of the same political party, and the director of highways, who shall be a member ex officio without compensation. Appointive members to be residents of State, and shall have been qualified electors therein for at least five years preceding their appointment. Commission shall elect one appointed member chairman, another vice-chairman, and shall appoint a secretary-treasurer who need not be a member. All members eligible for reappointment, vacancies filled for unexpired term only	Staggered eight year terms	Three members	Secretary-treasurer $50,000; other members $25,000, all approved by governor	$5,000, plus expenses
(2)	State Bridge Commission of Ohio	Three successful businessmen appointed by governor, not more than two of the same political party. Governor designates chairman and fills vacancies for unexpired term. Any commissioner eligible for reappointment. Commission shall appoint a secretary-treasurer.	Six years		Each member $10,000; approved by governor	$2,000 per year and expenses
(3)	City or County Bridge Commission	Upon passage of resolution three commissioners appointed by board of county commissioners or city legislative authority, not more than two to belong to the same political party, all eligible for reappointment. Vacancies filled for unexpired term. Commission appoints secretary-treasurer.	Staggered six year terms		$5,000 each commissioner	Not over $2,000 per year and expenses
Okla.	Oklahoma Turnpike Authority, an instrumentality of the State.	Composed of governor and one member from each congressional district appointed by him with consent of senate. Appointees to be residents of State and qualified electors therein for at least a year and are eligible for reappointment. Vacancies filled for unexpired term. Authority shall elect one appointed member chairman and another vice-chairman, and shall also elect a secretary and treasurer.	Originally appointed for varying terms, successors to serve staggered eight year terms.	Majority	$25,000 for appointed members, secretary and treasurer $100,000 each, all approved by governor	Actual expenses only
Pa. (1) through (10)	Pennsylvania Turnpike Commission, an instrumentality of the Commonwealth, created by act of May 21, 1937 (Pamphlet Law 774).	Commission consists of five members, four appointed by governor with consent of 2/3 of senate, and Secretary of Highways or ex officio member. Members shall elect one appointed member chairman and a secretary and treasurer who may not be a member.	Ten years, staggered, for appointed members, all eligible for reappointment. Vacancies filled for unexpired term.	Three members	$25,000 each appointed member, $50,000, secretary and treasurer, all approved by governor. Bonds cancelled when extension is designated part of system.	Increased to $15,000 for chairman and $13,000 for other appointed members, plus expenses all members
(11)	Pennsylvania Parkway Commission, an instrumentality of the Commonwealth.	Consists of three members; two residents of Commonwealth and qualified electors therein for at least one year preceding appointment by governor with consent of 2/3 of senate, and the secretary of highways ex officio. One appointed member to be elected chairman and a secretary and treasurer shall be elected who may not be a member.	Ten years (staggered)	Two members	$25,000 each appointed member, secretary and treasurer $50,000	$5,000 each appointed member and all members reimbursed expenses

Table 3. State Toll Facilities Legislation Analysis: Powers and Duties (continued)

State (cont'd)	(11) To Vacate Affected Highways When Necessary	(12) To Enter for Surveys	(13) To Control or Provide for Installation or Relocation of Public Utilities	(14) To Sell or Lease Unneeded Land	(15) To Fix Toll Rates or Other Charges	(16) To Authorize Concessions on Project	(17) Make Annual Report	(18) Annual Audit	(19) To Take Immediate Possession of Land	(20) To Acquire More Land Than Necessary For Project	(21) To Charge Tolls After Bonds Paid	(22) To Conduct Research and Studies
N. Y. (cont'd) (6)		Yes, and in Canada	Yes		Yes, after State advances reimbursed; prior thereto State budget director must approve						Yes	
Ohio (1)	Yes, upon petition to county court wherein located	Yes	Yes		Yes	Yes	Yes	Yes	Yes, upon deposit of the amount assessed; proceedings to be expedited		No	
(2) & (3)					Yes, but subject to any Federal or State public utility law requirements			Yes, books of State bridge commission by State auditor; no provision as to county and city commissions	Same as above		Yes, for operation and to repay any debt to State	
Okla. (1)		Yes	Yes		Yes	Yes, and real and personal property so leased subject to taxation as other privately owned property	Yes	Yes	Yes, upon deposit of sum assessed	No	No, but if bonds for any project unpaid tolls continued on all projects until bonds for all projects paid	
Pa. (1)		Yes	Yes	Yes	Yes	Yes			Yes		No	
(2)		Yes	Yes	Yes	Yes	Yes			Yes			
(3)		Yes	Yes	Yes	Yes	Yes			Yes			
(4)	Yes	Yes	Yes	Yes	Yes	Yes			Yes			
(5)	Yes	Yes	Yes	Yes	Yes	Yes			Yes			
(6)	Yes	Yes	Yes	Yes	Yes	Yes			Yes			
(7)	Yes	Yes	Yes	Yes	Yes	Yes			Yes			
(8)	Yes	Yes	Yes	Yes	Yes	Yes			Yes			
(9)	Yes	Yes	Yes	Yes	Yes	Yes			Yes			
(10)	Yes	Yes	Yes	Yes	Yes	Yes			Yes			

Table 3. State Toll Facilities Legislation Analysis: Powers and Duties (continued)

State (cont'd)	(11) To Vacate Affected Highways When Necessary	(12) To Enter for Surveys	(13) To Control or Provide for Installation or Relocation of Public Utilities	(14) To Sell or Lease Unneeded Land	(15) To Fix Toll Rates or Other Charges	(16) To Authorize Concessions on Project	(17) Make Annual Report	(18) Annual Audit	(19) To Take Immediate Possession of Land	(20) To Acquire More Land Than Necessary For Project	(21) To Charge Tolls After Bonds Paid	(22) To Conduct Research and Studies
Pa. (cont'd) (11)		Yes	Yes	Yes	Yes	Yes			Yes			
R. I. (1)	Yes, and streets	Yes	Yes		Yes	Yes	Yes, to governor	Yes, by State director of administration	No, but expedited			
Tex. (1)	No	Yes	Yes	Yes	Yes	Yes	Yes, to governor and legislature	Yes	No	Yes, severed land	No	Yes
Va. (1)	Yes	Yes	Yes	Yes. To reconvey	Yes	Yes	Yes	Yes	After failure to purchase, yes, upon deposit into court		No	
(2)	Yes		Yes		Yes				No		Yes	
(3)	Yes	Yes	Yes		Yes	Yes	Yes, to governor	Yes			No	Yes
(4)	Yes	Yes	Yes		Yes		Yes, to governor and political subdivision it passes through	Yes			No	
(5)	Yes	Yes	Yes		Yes		Yes	Yes			No	
Wash. (1)					Yes			Accounts shall be kept open to inspection of bondholders			Yes	Yes
(2)					Yes						Yes	Yes
(3)					Yes, but approval of consulting engineer required for tariff change							Yes
W. Va. (1)	Upon request of commission, State road commissioner shall vacate any road	Yes	Yes	Yes	Yes	Yes					Yes, to pay bonds issued for other projects	
Wis. (1)		Yes	Yes	Yes	Yes	Yes	Yes	Yes			No	Yes. May enter into contract for studies

State	(1) To Acquire Land by Eminent Domain	(2) To Construct and Maintain	(3) To Locate	(4) To Control Access	(5) To Contract	(6) To Employ Consultants	(7) To Accept Federal Aid	(8) To Incorporate State Highways in Project	(9) Project To Be Incorporated In State Highway System When Bonds Paid	(10) To Relocate State Highways
N. Y. (cont'd) (6)	Yes	Yes	Yes, as approved by superintendent		Yes	Yes, and legal consultants in Canada	Yes	Yes	Yes. Conveyed to State, including right to charge tolls	
Ohio (1)	Yes	Yes	Location to be approved by and design standards approved by director of highways	Yes	Yes	Yes	Yes, with approval of governor		Yes, if in good condition	Yes
(2) & (3)	Yes, and in adjoining State, and all powers conferred by Congress	No, to improve and maintain existing bridges			Yes	Yes		Yes, if connected therewith at both ends		
Okla (1)	Yes, surface rights only	Yes	Yes, most feasible route between designated termini	Yes	Yes, with certain restrictions and limitations	Yes, but to be kept at minimum and reported to legislature	Yes, and comply with Federal highway aid rules and laws	Yes	Yes, if in good condition	Yes, as approved by State highway commission
Pa. (1)	Yes	Yes, construction contracts to be approved by department of highways and construction to be under its supervision; to be maintained by department, under control of commission	Termini indicated, exact location to be approved by department of highways and governor		Yes	Yes			Yes	
(2)	Yes	Yes, construction and maintenance to be by department of highways under control of commission	Location to be approved by governor and department of highways		Yes, construction contracts to be approved by department of highways	Yes			Yes	Yes, subject to approval of department of highways
(3)	Yes	Same as above	Same as above		Same as above	Yes			Yes	Same as above
(4)	Yes	Yes. Turnpike to be constructed under supervision of department of highways; maintenance by and under control of commission through the department	Same as above		Yes, all construction contracts shall be approved by department	Yes			Yes	Same as above
(5)	Yes	Same as above	Same as above		Same as above	Yes			Yes	Same as above
(6)	Yes	Same as above	Same as above		Same as above	Yes			Yes	Same as above
(7)	Yes	Same as above	Same as above		Same as above	Yes			Yes	Same as above
(8)	Yes	Same as above	Same as above		Same as above	Yes			Yes	Same as above
(9)	Yes	Same as above	Same as above		Same as above	Yes			Yes	Same as above
(10)	Yes	Same as above	Same as above		Same as above	Yes			Yes	Same as above

State	(1) To Acquire Land by Eminent Domain	(2) To Construct and Maintain	(3) To Locate	(4) To Control Access	(5) To Contract	(6) To Employ Consultants	(7) To Accept Federal Aid	(8) To Incorporate State Highways in Project	(9) Project To Be Incorporated In State Highway System When Bonds Paid	(10) To Relocate State Highways
Pa. (cont'd) (11)	Yes	Yes, construction and maintenance to be through department of highways under control of commission	Parkway to be constructed in accordance with survey made by department of highways		Yes, construction contracts to be approved by department of highways	Yes			Yes	
R. I. (1)	Yes	Yes	Yes, with approval of director of public works	Yes	Yes	Yes	Yes		Yes	Yes
Tex. (1)	Yes, but only for road and right-of-way purposes	Yes	Yes, as approved by State highway commission	Yes	Yes	Yes	From any source		Yes, if in good condition	Yes
Va. (1)	Yes	Yes	Yes, as approved by governor	Yes	Yes	Yes	Yes		Yes, if in good condition	Yes
(2)	Yes	Yes			Yes	Yes	Yes	Yes		Yes
(3)	Yes	Yes	Yes, as approved by State highway commission		Yes	Yes	Yes	Yes	Yes, if in good condition	Yes
(4)	Yes	Yes	Same as above	Yes	Yes	Yes	Yes		Same as above	Yes
(5)	Yes	Yes	Same as above	Yes	Yes	Yes, and they permitted to have interest in contract and sell to authority	Yes		Same as above	Yes
Wash. (1)	Yes, director of highways acquires on orders of authority	No, by director of highways	Yes, except projects requiring specific authorization		Director of highways shall contract for construction. Authority and State officials may make desirable agreements	No, to use State personnel	Yes	Yes		
(2)	Yes, when legislature authorizes project	Same as above			Same as above			Yes		
(3)	Yes, in consolidated proceedings	Yes	Yes		Yes			Yes		
W. Va. (1)	Yes	Yes	Yes, with approval of State road commission	Yes	Yes; but over $1,000 only with approval of governor	Yes	Yes	Yes	Yes, if in good condition	Upon request of commission, State road commissioner shall relocate any road
Wis. (1)	Yes	Yes	Yes, (exact route and exact termini)	Yes	Yes	Yes	Yes		Yes	Yes

(A) Bonds

State	(1) Authority to Issue	(2) Rate of Interest	(3) Period of Amortization	(4) Interim or Temporary Bonds	(5) Negotiable Instruments	(6) Restrictions on Sale Price	(7) Public or Private Sale	(8) Pledging Credit of State	(9) Exemption from Taxation	(10) Investment by Public Institutions	(11) Refunding Provisions	(12) Other Re Securities
N. Y. (cont'd) (3)	Yes, to $40 million	At lowest interest cost, or highest price	Not later than 40 years	May borrow money on bank loans	Yes	To be sold at lowest interest cost, or highest price, as authority determines, but not for less than 98% of par value plus accrued interest	Public	No	Same as above	Yes	Yes	
(4)	Yes	Not to exceed 4%, payable semiannually	Not over 50 years	Five year notes	Yes	For such price or prices as authority determines	Either		Yes	Yes	Yes	Throgs Neck and Narrows Bridge bonds redeemable as a whole in 15 or more years at 101% of face value and interest
(5)	Yes, not exceeding $70 million, and notes	As authority determines, payable semiannually	Not over 50 years		Yes	Same as above	Either	No	Yes, except for estate and transfer taxes	Yes	Yes	State pledges not to modify bonds and notes to injury of other holders
(6)	Yes, and notes to pay cost of ferries	Not to exceed 5%, payable semiannually	Not to exceed 40 years		Yes	For a price not less than 96% of par value, plus accrued interest, but interest cost not to exceed 5%	Public	No, nor of county	Yes, except for estate taxes	Yes	Yes	
Ohio (1)	Yes, of the State	Not over 5%	Not over 40 years	Yes	Yes	For such price as commission may determine, but interest on money received not to exceed 5% per annum	In such manner as commission may determine	No	Yes		Yes, and may issue for improvements and extensions	Bond issuance need not comply with any other law
(2) & (3)	Yes	Not over 6%, payable semiannually	Not over 30 years	Yes	Yes	Same as above, but interest not to exceed 6%	Public		Yes, State and municipal	Yes		Additional bonds may be issued if a deficit
Okla.	Yes, may issue for any part, one or more or all projects	Not over 5%	Not over 40 years	Yes	Yes	For such price as authority determines is for the best interest of the State, but not so low as to require the payment of more than 5% interest	Either	No	Yes	Yes	Yes	Authority may apply to State supreme court for determination of validity of bonds and trust fund
Pa. (1), (2) & (3)	Yes	Not over 6%	Not over 40 years	Yes	Yes	Shall not be sold at a price so low as to require the payment of interest on money received therefore more than 6%, computed in accordance with standard tables of bond values	In such manner and for such price as commission may determine	No	Yes	Yes	Yes	
(4) thru (10)	Yes	Not over 6%	Not over 40 years	Yes	Yes	Same as above	Same as above	No	Yes	Yes	Yes	
(11)	Yes	Not over 6%	Not over 40 years	Yes	Yes	Same as above	Same as above	No	Yes	Yes	Yes	
R. I (1)	Yes	Not over 6%	Not over 50 years	Yes	Yes	For such price as authority determines, but not for less than 97% of principal amount of bonds	Either	Only on Newport Bridge bonds	Yes	Yes	Yes, and for project improvements	Authority dissolved if no bonds issued by May 3, 1971

Table 4. State Toll Facilities Legislation Analysis: Financing (continued)

State (cont'd)	(B) Protection of Bondholders (13) Restrictions Re Mortgaging	(14) Assignment of Revenue from Bonds or Tolls	(15) Redress	(C) Revenue (16) Sinking Fund Provisions	(D) Financing of Preliminary Expenses (17) Maximum Amount	(18) Source	(E) Exemption of Property from Taxes (19)	(F) Special Provisions (20)
N. Y. (cont'd) (3)		Yes, tolls from Southern State Parkway and any other revenues	Yes					State covenants to prohibit competing facilities. Construction of additional parking facilities at Jones Beach costing $1-1/4 million authorized
(4)		Yes, any moneys or revenues, subject only to agreement pledging any particular tolls or revenues	Yes, including receivership	Yes	$550,000 appropriated		Yes	State covenants to limit competing facilities
(5)		Yes, may pledge tolls and revenues of bridge or ferry	Same as above	Bond resolution may provide for sinking funds	$550,000 appropriated	Legislative appropriation for capital construction fund, to be reimbursed		State pledges to limit competitive facilities and preserve rights of the authority. Directed all moneys be paid to State comptroller and paid out on his check
(6)		Yes, tolls and revenues	Same as above	Same as above	As allocated by director of budget	Advance from $15 million appropriation		State pledges to limit competing facilities and that it will not limit or alter rights of authority to prejudice of bondholders
Ohio (1)		Yes	Yes	Yes	None stated	Department of highway funds, as approved by commission; to be reimbursed	Yes	May issue bonds for any one or more turnpike projects
(2) & (3)	Yes	Yes	Yes	Yes				Bonds shall be signed by the governor
Okla.	Yes	Yes	Yes	Yes	$1,500 per mile	State highway commission funds expended with approval of authority	Yes, but concessions subject to county tax	Average amount spent by turnpike users on gasoline taxes calculated and formula devised whereby a corresponding amount, not over $1 million yearly, is turned over to authority to make up any deficit, on the condition that trust fund at no time exceed $4 million or an amount equal to 3 years interest on all turnpike bonds
Pa. (1), (2) & (3)	Yes	Yes, tolls and revenues	Yes	Yes			Yes	
(4) thru (10)	Yes	Yes	Yes	Yes	May borrow not exceeding total cost of turnpike	Issue turnpike noted or other revenue obligations of commonwealth at not over 6%, but faith and credit of commonwealth not pledged for their payment	Yes	Authorized to combine projects for financing
(11)	Shall not convey or mortgage parkway or part	Yes	Yes	Yes			Yes	
R. I. (1)	Yes	Yes, pledged to sinking fund	Yes	Disposition of sinking funds subject to provisions of bond resolution or trust agreement			Yes	May combine projects for financing. State covenants against competition

Table 5. State Toll Facilities Legislation Analysis: Miscellaneous (cont'd)

State	Policing	Authority of Local Unit to Lease or Convey Real Property to an Authority Without Advertisement	Responsibility for Damage or Bodily Injury	Regulatory Power
Pa. (1) through (11)	Such force of police, toll-takers and other operating employees as the Commission may employ	Yes, and from all public agencies and commissions of Commonwealth, including public roads and other real property already devoted to public use	For property damage	
R. I. (1)	May contract with State Police		For damage to public facilities or from relocating any public way or place and from surveys	Fine to $100 and imprisonment to 30 days for failure to pay toll
Tex. (1)	Such police, toll-takers and other operating employees as Authority may employ, may agree with Department of Public Safety for its police officers	Yes	Private property damaged to be repaired or restored or compensation made	Fine to $100 for nonpayment of tolls with lien on and possession of vehicle until paid
Va. (1)	Such force of police, toll-takers and other operating employees as the Commission may employ	Yes	Directed private property damaged be repaired or restored or compensation made. Grade separation and highway vacation damage to be paid as cost of project	Fine to $1,000 and imprisonment to 1 year for interest in contract by member, agent or employee
(2)	Projects policed in whole or in part by officers of Department of State Police; all other State and local police to have same powers on as they have beyond project. Commission authorized to employ "project guards" to summon or arrest on view violators of rules and regulations, except those paralleling State law	Authorized to accept contributions of any thing of value from any public or private body	Public and private property damaged or destroyed to be restored or repaired or compensation made, and public way vacation or relocation damage paid	Violation of Commission rules and regulations a misdemeanor or punished as if committed on public road or street
(3)	Commission police and local police	Yes	For property damage	One hundred dollar fine; 30 days for failure to pay toll
(4)	State Police	Yes	Property damage	Violation of law or turnpike regulations a misdemeanor or punished as if on public street. One thousand dollar; one year for member, agent, or employee to be interested in contract
(5)	Authority police or State Police	Yes	Same as above	Same as above
Wash. (1)			Insurance or indemnity bonds as protection against any loss or damage, including loss or interruption of tolls, permitted	
(2)			Authority, and not State, subject to common carrier laws for loss or damage to property and injury or death to shippers and passengers. Injury or death to other persons limited to amount of insurance. Seamen permitted to sue authority for injuries, applying Federal law. Execution on judgment or attachment against authority property or maritime lien against vessels prohibited, but order of court may require authority to pay any judgment	
W. Va. (1)	By members of Department of Public Safety by agreement with and at cost of turnpike commission	Yes	For damage in changing location of any private road or public highway and from surveys. Directed private property damaged or destroyed be repaired or restored or compensation made	A misdemeanor for placing sign or other markings on any public road or highway punishable by fine from $25 to $100 each day. Evasion or attempted evasion of tolls, or aiding another therein, or intentional trespass on project a misdemeanor punished by fine not over $50
Wis. (1)	Motor vehicle laws declared applicable to turnpikes and they are deemed public highways for that purpose and not subject to any local traffic laws. Corporations authorized to hire persons, with approval of Governor, vested with powers of State traffic officers to enforce laws		Reimbursement directed for actual damage from surveys, from public utility line relocation, from grade separations and changes and compensation for use of State lands	Penalties as provided by law for class A highways

H-062

Highway Research Board.
MOTOR VEHICLE SPEED, VOLUME, WEIGHT AND TRAVEL TIMES. Highway Research Board Bulletin 303. National Research Council. National Academy of Sciences, Washington, D.C., 1961.

Contains eight articles on the effect of speed limit signs on speed on suburban arterial streets, effects on speed and accidents of improved delineation at hazardous locations, application of mechanical analysis to traffic recorder data, statistical evaluations of truck weight characteristics, a study of urban travel times in Pennsylvania cities, effects of commercial roadside development on traffic flow, development and use of maximum-car technique for measuring travel time, and an analysis of urban travel times and traffic volume characteristics. One of these articles has been abstracted and appears in the Bibliography under C-021.

H-063

Highway Research Board.
NIGHT VISIBILITY. Highway Research Record, no. 179. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967.

Of the seven reports one summarizes an experimental study of luminance requirements for illuminated signs, another gives the results of an investigation of the effect of spray from passing vehicles on milepost markers, another describes a method for obtaining pavement reflectance data, a fourth gives the results of a study of the use of expanded metal mesh as an anti-glare screen and a fifth describes the use of pavement delineation materials at night. The other two articles have been abstracted and appear in this bibliography under R-005 and T-006.

H-064

Highway Research Board.
ORIGIN AND DESTINATION. Highway Research Record, no. 141. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966.

Four papers concerning urban transportation problems are presented, including an analysis of travel trends in Toronto, 1954-1964; a study of the factors in work-trip lengths; a discussion of the use of 1960 census data for urban transportation planning; and an investigation of the basic concepts and procedures used in transportation studies, e.g. land use, activity, and non-residential trip generation.

H-065

Highway Research Board.
ORIGIN AND DESTINATION: METHODS AND EVALUATION. Highway Research Record, no. 114. Highway Research Board, National Research Council. National Academy of Sciences, Washington, D.C., 1966.

Contains ten papers, five discussions and other material dealing with applications and uses of origin-destination data, treating such subjects as trip generation evaluation, traffic assignments, trip distribution procedures, land-use models, transit and highway interactions, transit riders, etc.

H-066

Highway Research Board.
PLANNED COMMUNITIES. Highway Research Record, no. 97. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

Five reports covering: the role of the Federal Government in assisting in the development of sound urban growth through various techniques, one of which is the "planned community"; the advantages of planned communities and the relationships between transportation and land use that must be considered in shaping new urban growth patterns; planned communities, two of which are described in some detail: Columbia, Maryland and the Bluffs, a planned community on the Irvine Ranch, Newport Beach, California; European efforts in planning with Stockholm, Harlow, Cumbernauld, Tapiola, Rotterdam and Warsaw given as examples. One report has been abstracted and appears in the Bibliography under E-006.

H-067

Highway Research Board.
PLANNING IN HIGHWAY ADMINISTRATION. Highway Research Board Special Report 72. National Research Council. National Academy of Sciences, Washington, D.C., 1962.

The proceedings of a Conference held in March 1962 whose aim was to discuss planning for solving basic problems of State highway administrators, using the planning process for realignment of finances and improvement of administration, and to identify research needs that will improve planning functions. Topics included highway planning concepts, development and goals, needs, social, economic, and financial aspects of planning information, administration problem areas, utilization of information, and future trends. Some of the most pressing social, economic, and financial problems facing highway planners and administrators were discussed, and the types of information needed for their solution were described.

H-068

Highway Research Board.
PROGRAMING AND NEEDS 1963 AND 1964. Highway Research Record, no. 87. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

Six papers covering: computer-processing techniques for the concept that each alternative for improvement of a deficient highway section can be evaluated as an investment opportunity that can yield a specific rate of return in terms of congestion dollars; the testing of a priority formula for programming urban arterial street improvements; priority arrangements of programmed projects in allocating the fixed pool of classified manpower resources for a predetermined time interval; a computer program to determine what highway design standards can be provided with anticipated funds; a computer program in Minnesota for a continuing trunk highway needs study, designed for periodic revision to allow for changes in design criteria, traffic data, and cost factors without disrupting the basic information. One paper has been abstracted and appears in the Bibliography under M-005.

H-069

Highway Research Board.
ROAD USER CHARACTERISTICS. Highway Research Record, no.122. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966.

Nine reports dealing with various road-user characteristics including the relation of individuals' driving records to visual acuity, an automatic system for vehicle control, recording of a driver's visual input, study (by simulation) of wrong-way driving on freeway off-ramps, drivers' attitudes toward alternative highways, changes in driver performance with time in driving, effects of fatigue on performance, and nighttime aspects of relative velocity detection by drivers.

H-070

Highway Research Board.
ROADSIDE DEVELOPMENT. In: Highway Research Record, no. 23. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963.

14 reports cover a variety of topics including the role of the landscape engineer, highway location as a problem of urban and landscape design, landscape architects in highway organization, aesthetic factors in urban arterial highway planning, future roadside development, noise abatement, mulching, control of soil subject to wind erosion, turf management, sewage sludge as a mulch, photogrammetry and photographic interpretation in landscape development, turf mixtures for roadside seedings. One paper (on interstate system rest areas) has been abstracted and appears in the Bibliography under E-001.

H-071

Highway Research Board.
SELECTED PROBLEMS RELATING TO HIGHWAY LAWS. Highway Research Board Special Report 76. National Research Council. National Academy of Sciences, Washington, D.C., 1962.

A compilation of papers and discussions presented at a workshop on highway law, which includes selected topics within the fields of highway legislation, condemnation procedure, inverse condemnation claims, tort liability, and contract administration. Research in highway legislation was emphasized, and many of articles were followed by discussions.

H-072

Highway Research Board.
SHIFTING EMPHASIS IN TRANSPORTATION AND ITS IMPLICATIONS FOR RESEARCH. Highway Research Record, no. 183. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967.

Contains three reports on shifting emphases in transportation and federal government and coordinated transportation. Two of the papers have been abstracted and appear in this bibliography under L-003 and R-010.

H-073

Highway Research Board.
SHOPPING CENTERS AND PARKING. Highway Research Record, no. 130. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D. C., 1966.

Three papers are included. Two are concerned with parking and traffic requirements at large planned shopping centers, while the other is a study of fringe parking usage for transit riders, based on Washington D. C. studies. The paper on fringe parking usage focuses on the feasibility of extended use of parking facilities for transit users, and arrives at conclusions which could be influential in the success or failure of fringe parking in cities generally. The paper on shopping center parking requirements presents research derived from 270 centers throughout the U. S. and Canada and recommends appropriate standards for application to zoning ordinances for new centers. The third paper applies mathematical modeling to calculate maximum generation of traffic to planned shopping centers. The model derived used trips/sales ratios.

H-074

Highway Research Board.
SOIL MAPPING: METHODS AND APPLICATIONS. Highway Research Board Bulletin 299. National Research Council. National Academy of Sciences, Washington, D.C., 1961.

Nine papers. Subjects include the preparation of soil strip maps for state highway projects, the use of a pedologic map in a highway soil survey, the use of agricultural soil maps for highway engineering, the application of airphoto interpretive techniques, cooperative soil mapping projects, terrain mapping, use of geologic strip maps in highway location and design, a technique for soil mapping, and a state engineering soil study. States represented are: Michigan, Illinois, Nebraska, Maine, Indiana, New York, Massachusetts, Rhode Island, and Maryland.

H-075

Highway Research Board.
STATE HIGHWAY ADMINISTRATION ORGANIZATIONS; AN ANALYSIS. Highway Research Board Special Report 51. National Research Council, National Academy of Sciences, Washington, D.C., 1959.

After a brief historical survey, the type of administration (single executive, commission, or mixed) is given as found in the 48 states (Alaska and Hawaii did not have such at the time). The advantages and disadvantages of the several types are discussed. The method of selection (election, appointment by the governor) is given by state and the geographic representation (for commissions) and other qualifications summarized. An appendix lists in tabular form the name of the state, the date the department was created, its title, the composition, term of office and salary of the top administration, and data regarding the chief administrative officers. The page which gives this material for Pennsylvania is reproduced on the next page.

State	Date first department was created	Title of department or commission	Top administrative organization			Chief administrative and executive officers					
			Composition	Term of office	Salary	Chief administrative officer	Term of office	Assistant chief administrative officer	Term of office	Chief engineering officer	Term of office
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Oklahoma	1911	State Highway Department	Commission - 8 Members: Appointed by the Governor, subject to senate confirmation, one from each of eight congressional districts, as existed January 27, 1947, to be citizens and residents thereof for at least three years prior to appointment. The commission elects a chairman, a vice-chairman, and a secretary from among its members. The Governor is an ex officio member of the commission, but votes only in case of a tie.	8-year staggered terms, two expiring every two years on February 15. Removal by the Governor at his pleasure.	1/ $3,600	State Highway Director: Elected by a majority vote of the entire commission, and shall be a qualified and competent engineer.	At the pleasure of the commission.	Assistant Director: State highway engineer serves in this capacity by appointment of commission.	At the pleasure of the commission.	State Highway Engineer: Appointed by the director, who determines his qualifications and prescribes his duties.	At the pleasure of the director.
Oregon	1913	State Highway Commission	Commission - 3 Members: Appointed by the Governor, not more than one from any congressional district, and in case of a vacancy for any cause the new member must be appointed from the same congressional district as the one in which the vacancy occurs. The commission selects one of its members as chairman.	3-year staggered terms, one expiring each March 31.	Actual traveling and other necessary expenses.	State Highway Engineer: Appointed by the commission, and shall be a competent civil engineer, qualified by technical training as well as by practical experience in highway engineering.	At the pleasure of the commission, but not in excess of four years without reappointment.	Deputy State Highway Engineer: Appointed by the commission, in keeping with the competitive provisions of the State civil service, and shall be a competent civil engineer qualified by technical as well as by practical experience in highway engineering.	At the pleasure of the commission.	State Highway Engineer.	See column (8).
Pennsylvania	1903	Department of Highways	Secretary of Highways: Nominated and, by and with the advice and consent of two thirds of all members of the senate, appointed by the Governor. Serves full time and is also a member of the Governor's cabinet.	4 years, from the third Tuesday of January next following the election of Governor and until a successor is appointed and qualified. Serves at the pleasure of the Governor.	$20,000	The Secretary of Highways	See column (5).	Chief Deputy Secretary: Appointed by the secretary with the approval of the Governor.	No specific term.	Deputy Secretary for Engineering: Appointed by the secretary with the approval of the Governor. Shall be especially qualified for his position by training and experience in the particular kind of work which his duties will require him to perform.	No specific term.
Rhode Island	1896	Department of Public Works, Division of Roads and Bridges.	Director of Public Works: Appointed biennially by the Governor, subject to senate confirmation or rejection within three days after notification.	2 years, at the pleasure of the Governor. Serves until a successor is duly appointed and qualified.	$12,500	The Director of Public Works.	See column (5).	Deputy Director of Public Works: Is in the classified civil service and is appointed through competitive examination.	Indefinite, subject to the civil service laws.	Chief Engineer: Is in the classified civil service and is appointed through competitive examination.	Indefinite, subject to the civil service laws.
South Carolina	1917	State Highway Department	Commission - 14 Members: Elected from the judicial circuits of the State which are constituted and created highway districts, one from each district, by majority vote of the legislative delegations representing said districts. Representation of a given highway district on the commission shall be rotated among the counties of the district except by unanimous consent of all members of the legislative delegation from the district. Commission selects its own chairman.	4-year staggered terms, expiring on April 15 of the appropriate year, or until a successor shall have been elected and qualified.	$100 per year. 1/	Chief Highway Commissioner: Appointed by the commission to serve as administrative and executive head, with authority to act for the commission when not in session. Shall be a citizen of practical and successful business and executive ability.	4 years. The right to remove or discharge holder of this position is reserved to the commission.			State Highway Engineer: Appointed by the commission, and shall be a competent engineer, [illegible] experienced in highway planning, design, construction and maintenance, and shall be an engineering graduate of a college or university with an accredited course in engineering. Selection may be by civil service examination under rules and regulations of the commission.	At the discretion of the commission.
South Dakota	1913	Department of Highways	Commission - 4 Members: Consisting of the Governor, who shall be ex officio chairman, and three commissioners, appointed by the Governor, who shall be competent authorities on road building and devote their entire time to the administration of the business of the highway department.	4 years, but any commissioner may be removed from office by the Governor at his discretion.	1/ $3,000	Director of Highways: Appointed by the commission, to be the principal executive and administrative officer of the department and also secretary of the commission.	4 years, unless sooner removed for cause.			State Highway Engineer: Appointed by the commission, and shall be a graduate engineer registered in the State as a professional engineer and land surveyor.	At the pleasure of the commission.

H-076

Highway Research Board.
STATISTICAL AND MATHEMATICAL ASPECTS OF TRAFFIC. Highway Research Record, no. 118. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966.

Six papers devoted to statistical and mathematical considerations of traffic: ramp capacity, better movement of traffic through traffic signals, driver performance at stop-controlled intersections, fundamentals of driver decisions at intersections, and use of a computer to simulate driver behavior at intersections.

H-077

Highway Research Board.
STUDIES IN HIGHWAY ENGINEERING ECONOMY. Highway Research Board Bulletin 320. National Research Council. National Academy of Sciences, Washington, D.C., 1962.

Four papers are presented on: comparisons of simulation methods with customary user-cost analyses of vehicle operating costs; estimating benefits and costs of secondary road improvement; total annual cost measurements; most-economic design procedures as applied to bridges and roadways crossing flood plains. One paper has been abstracted and appears in the bibliography under O-003.

H-078

Highway Research Board.
TOP ISSUES IN URBAN RESEARCH 1963. Highway Research Record, no. 64. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963.

Four reports dealing with costs of urban transport systems, system configurations, levels of data collection, and characteristics of intercity travel. All have been abstracted and appear in this bibliography under C-015, H-006, L-016, and W-016.

H-079

Highway Research Board.
TRAFFIC CONGESTION AS A FACTOR IN ROAD-USER TAXATION. Highway Research Record, no. 47. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964.

Contains six articles on: the relation between optimum congestion tolls and present highway user charges; theory of spillover cost pricing; investment in two-mode transportation systems; theory of efficiency tolls; congestion tolls; principles of urban transportation pricing.

H-080

Highway Research Board
TRAFFIC CONTROL: DEVICES AND DELINEATION. Highway Research Record, no. 105. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966.

Seven papers dealing with the problem of using traffic control devices to guide drivers and the role of medians in providing traffic seperation and delineation. Five of the papers are by state highway department authors and reflect research undertaken with the aid of their departments.

H-081

Highway Research Board.
TRAFFIC FLOW CHARACTERISTICS 1963 and 1964. Highway Research Record, no. 72. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

Contains seven reports on different aspects of traffic flow including the complexities of analysis of speeds, a mathematical model for simulating traffic flow characteristics and the geometric parameters, effects of changes in highway operation, and a method for estimating present and future traffic volume when few data are available. One of the papers has been abstracted and appears in the bibliography under W-020.

H-082

Highway Research Board.
TRAFFIC FLOW THEORY. Highway Research Record, no. 89, Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

Three reports, concerned with the theoretical aspects of operating a freeway control system in peak periods, the use of traffic simulation to determine the delay and the fuel consumption of vehicles at intersections, and the "spillback" that results from queueing on ramps.

H-083

Highway Research Board.
TRAFFIC ORIGIN-AND-DESTINATION STUDIES; APPRAISAL OF METHODS. Highway Research Board Bulletin 253. National Research Council. National Academy of Sciences, Washington, D.C., 1960.

Papers dealing with: estimation of efficient spacing for expressways and arterial highways; trip generation within the central business district; tests of interactance formulas derived from origin-destination data; interpretation of desire line charts made on a cartagraphatron; keeping origin and destination data current; sample size; land use forecasting for transportation planning; the New York Port Authority's survey employing continuous origin-destination sampling; a theoretical prediction of work-trip patterns; a critique of home-interview type origin-destination surveys. There is also a panel discussion on inter-area travel formulas. One of the articles has been abstracted and appears in the Bibliography under L-024.

H-084

Highway Research Board
TRANSPORTATION AND ECONOMIC DEVELOPMENT. Highway Research Record, no. 115. Highway Research Board. National Research Council, National Academy of Sciences, Washington, D.C., 1966.

H-085

Highway Research Board.
TRANSPORTATION SYSTEM ANALYSIS AND EVALUATION OF ALTERNATE PLANS. Highway Research Record, no. 180. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967.

Nine reports concerning transportation system analysis, on: the methodology used to evaluate alternative alignments for a Chicago expressway, the efficacy of traditional cost-benefit methodology, transportation implication of alternative sketch plans, a decision-making technique for transportation planning, design conceptualization and evaluation of the indirect impacts of alternative Northeast Corridor transportation systems, the preliminary engineering economy analysis of 5 alternative urban transportation systems, and the economic evaluation of investments in agricultural penetration roads in developing countries. Three of these papers have been abstracted and appear in the Bibliography under H-090, J-002, and M-007.

H-086

Highway Research Board.
TRANSPORTATION SYSTEM EVALUATION. Highway Research Record, no. 148. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966.

Five papers dealing with: development of transportation system alternates, criteria for evaluating alternates, application of linear programming to optimization of a radial transportation network, effective use of computers for transportation problem-solving, and a methodology for evaluating costs and benefits of alternative urban transportation systems.

H-087

Highway Research Board.
TRAVEL PATTERNS. Highway Research Record, no. 88. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

8 reports on the use of the gravity model, modal split procedures, traffic assignment techniques, procedures for determining travel patterns, a method for estimating potential increases in traffic volumes, and a review of existing land-use forecasting techniques. Three of these reports have been abstracted and appear in the Bibliography under E-030, S-013 and S-023.

H-088

Highway Research Board.
URBAN TRANSPORTATION: DEMAND AND COORDINATION. Highway Research Board Bulletin 326. National Research Council. National Academy of Sciences, Washington, D.C., 1962.

Five papers covering: basic relationships between people, cities, and their transportation requirements; trends in travel and in urban development; rationale for predicting travel modes in urban areas; the characteristics of public and private transportation as related to various predictors, and the interrelationships between the above; the experience in the Chicago metropolitan area which has disclosed elements previously not dealt with adequately in urban transportation planning; a method for getting realistic local highway plans. Two papers have been abstracted and appear in the bibliography under M-020 and W-017.

H-089

Highway Research Board.
URBAN TRANSPORTATION PLANNING TECHNIQUES AND CONCEPTS. Highway Research Record, no. 102. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

The papers contained in this record are concerned with various administrative concepts, mathematical models, and other planning concepts directly related to the urban transportation process including politics and administration, determining community values, multiple regression models of small-area population change, metropolitan airport systems, automobiles and buses in the core, underground highways and parking facilities. Three papers from this report have been abstracted and are listed in the Bibliography under H-005, L-001 and L-009.

H-090

Hill, Morris.
A METHOD FOR THE EVALUATION OF TRANSPORTATION PLANS. In: Transportation System Analysis and Evaluation of Alternate Plans. Highway Research Record, no. 180. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967, pp. 21-34.

"Goal-achievement analysis," a plan evaluation method which allows analysis of multiple objectives for a single system, is described. A transportation goal-hierarchy is presented. Transportation ideals, objectives, policies and requisites are proposed. By determining how various objectives will be affected by proposed plans, the goals-achievement matrix can determine the extent to which certain specified standards are being met. Objectives must be weighted. To illustrate the analysis method, three of the postulated transportation objectives are examined: reduction of accident rate, reduction of community disruption, and reduction of air pollution.

H-091

Hitchcock Publishing Company.
HITCHCOCK'S MASS TRANSPORTATION DIRECTORY. Hitchcock Publishing Company, Wheaton, Illinois, 1959-1960 edition.

A directory of the manufacturers and suppliers serving the mass transportation industry, the industry itself, and a list of industry associations; and operating, capacity, and investment data on the companies which operate city, suburban and intercity buses, passenger railroads and passenger airlines in North America. The section on National and Regional Associations includes the addresses and officer lists of those organizations which are allied with the transportation industry.

H-092

Hodgkins, E.A.
EFFECT OF BUSES ON FREEWAY CAPACITY. In: Freeway Operations. Highway Research Record, no. 59. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964, pp. 66-82.

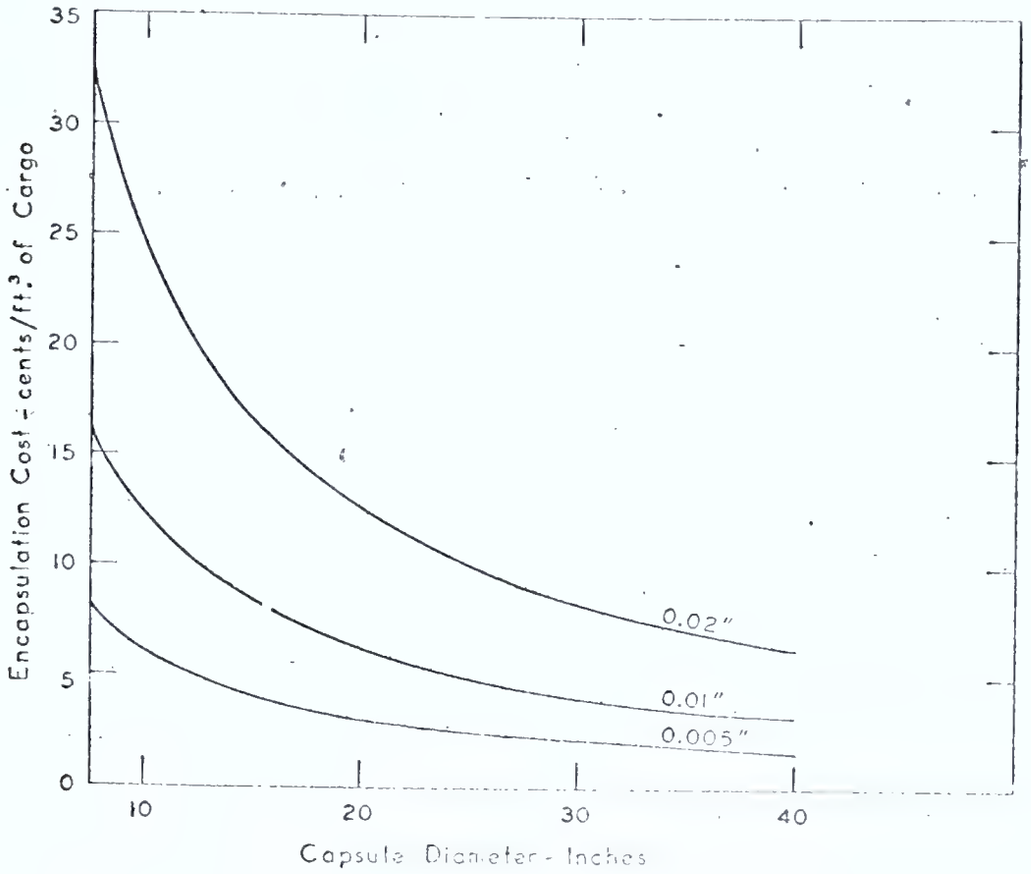
Effect of Buses on Freeway Capacity. E.A.HODGKINS. Nat Research Council—Highway Research Board—Research Rec n 59 1964 p 66-82. Study was conducted to measure speeds and spacing between buses on freeways or other high-type facilities, where several buses form continuous group at relatively frequent intervals during peak periods, and to determine passenger car equivalent of buses on such roads; study was designed to determine theoretical maximum volumes within specified speed range; volumes were computed for level, tangent sections of freeway with 12-ft lane widths and no lateral restrictions; effects of freeway interchanges, grades, ramps and ramp spacing were not considered.

H-093

Hodgson, G.W. and L.H. Bolt.
PIPELINE FLOW OF CAPSULES; POTENTIAL INDUSTRIAL APPLICATIONS.
Engineering Journal, vol. 45, Dec. 1962, pp. 25-30.

Capsule pipelining, moving large coherent segments as a part of a flowing stream, is examined. The basic science is discussed briefly and the economics of the process are explored in detail. Additional costs for piping, pumping stations, operating expenses, due to the reduced loading factor in this system, are examined. Costs and technology of encapsulation, the major cost item of the system, are also discussed. They were found to vary inversely with capsule diameter as shown in the chart below. Possible applications are explored; these include shipping grain, minerals, chemical products, and forest products.

Fig. 4. Cost of encapsulation per cu. ft. of cargo as a function of capsule scale-up over a range of capsule diameters and various plastic film thicknesses when the capsule length equals five capsule diameters, based on a disposable film costing about 50 cents/lb. in place.



H-094

Hoel, L.A.
CONSIDERATIONS AFFECTING THE CHOICE OF URBAN TRANSPORTATION SYSTEMS. Traffic Engineering, vol. 37, May 1967, pp. 36-8+.

H-095

Hoel, L.A.
TRUCK TRAVEL IN LOS ANGELES METROPOLITAN AREA. Traffic Quarterly, vol. 18, no. 4, Oct. 1964, pp. 535-53.

Truck Travel in Los Angeles Metropolitan Area, L.A.HOEL. Traffic Quarterly v 18 n 4 Oct 1964 p 535-53. Aspects of truck travel based on internal origin-destination surveys completed in connection with Los Angeles Regional Transportation Study are presented; paper describes design and quality of both surveys, discusses some characteristics of truck travel which were observed in comparing two truck populations, and presents some aspects of commodity movement by truck.

H-096

Hogan, W.J.
OPERATING COST OBJECTIVES OF V/STOL AIRCRAFT FOR COMMERCIAL AIRLINE SERVICE. SAE-Paper 650243 for meeting Apr. 12-15, 1965, 6 p.

Operating Cost Objectives of V/STOL Aircraft for Commercial Airline Service, W.J.HOGAN. SAE—Paper 650243 for meeting Apr 12-15 1965 6 p. V/STOL aircraft may offer potential solution to short-haul losses of commercial airlines; operational and economic characteristics desirable in V/STOL aircraft, designed for commercial service over routes of 150 mi or less, are examined; current helicopter cost experience is analyzed and results of simulation of helicopter operations over typical short-haul truck line route are reported; V/STOL cost trends are compared with comparable cost trends of fixed-wing aircraft in short-haul commercial service; economic requirements are discussed and sensitivity of V/STOL costs to changes in various cost determinants is analyzed.

H-097

Holmes, E.H.
HIGHWAY TRANSPORTATION. In: U.S. Transportation: Resources, Performance and Problems. A collection of papers prepared for the Transportation Research Conference convened by the National Academy of Sciences at Woods Hole, Massachusetts, August 1960. National Research Council. National Academy of Sciences, Washington, D.C., 1961. Publication 841-S. pp. 3-86.

The following aspects of highway transportation are discussed and statistics presented: the physical plant, including motor-vehicle production and registrations, highway mileage and systems, and land use; transport functions, including highway usage, vehicle-mile and ton-mile trends; comparison of travel with GNP and highway expenditures, motor-vehicle ownership and use, traffic speed trends, cyclical traffic patterns, bus transportation, highway freight transport, movements by various forms of transportation, urban traffic, federal aid for highways, capital investment, costs of owning and operating an automobile, and costs of owning and operating highways; operation and administration of highways including political aspects and employment levels; forecasts for movements over highways, including line-haul trucking; problem areas of safety, planning, design, construction, maintenance, and traffic operations.

H-098

Holshouser, E.C.
ACCOUNTING AND BUDGETING REQUIREMENTS FOR ADVANCE CONSTRUCTION PROGRAMS. In: Formulating Highway Construction Programs. Highway Research Board Special Report 62. Workshop Conference Proceedings, September 19-20, 1960. National Research Council. National Academy of Sciences, Washington, D.C., 1961. pp. 57-62.

A description of the development of a reasonably firm, long-range highway construction program in Kentucky, and the control of the program through the use of electronic data processing equipment. A comprehensive construction budget was first initiated in 1958 and information was programmed into a computer not being fully utilized. The status of each project in terms both of money spent and of technical progress was continuously available to the executives responsible for the program. A list of the things needed for proper administration included a firm, priority-based road-building program, adequate coordination between the budget and the schedules staff, a standard for processing certain checks, more careful attention to details to prevent delay in payment of right-of-way vouchers, accounting records of Federal aid, and a revision of the right-of-way procedure to prevent tying-up money unnecessarily.

H-099

Holzhauser, C.A., et al.
DESIGN AND OPERATING CONSIDERATION OF COMMERCIAL STOL TRANSPORTS. J. of Aircraft, vol. 2, no. 2, Mar.-Apr. 1965, pp. 87-93.

Design and Operating Consideration of Commercial STOL Transports, C.A.HOLZHAUSER, W.H.DECKERT, H.C.QUIGLEY, M.W. KELLY. J of Aircraft v 2 n 2 Mar-Apr 1965 p 87-93. Use of STOL aircraft for commercial short-haul transportation system is studied; design, operating characteristics, and costs are examined and compared to conventional aircraft; reasons for providing short-haul transports with STOL capability are increase in number of airfields from which aircraft can be operated and increase in safety and/or reduction in instrument flight rules minimums;

H-100

Homburger, W.S. and Eager, W.R.
AUTOMOBILE PARKING REQUIREMENTS AT AIRPORTS. ASCE Proceedings, vol. 90, (J. Aero-Space Transport Division), no. AT2, Oct. 1964, paper 4078, pp. 141-159.

Automobile Parking Requirements at Airports, W.S.HOMBURGER, W.R.EAGER. ASCE—Proc v 90 (J Aero-Space Transport Div) n AT2 Oct 1964 paper 4078 p 141-59. It is emphasized that concepts, criteria, and operating methods for airport garages must be different from business-area parking garages, and that consideration must be given to automated passenger, baggage, and automobile handling.

H-101

Horn, J.W. et al.
EXAMINATION AND COMPARISON OF ADT GRAVITY MODELS. Final Report, Project ERD-110-X, Engineering Research Department, North Carolina State University, Raleigh, N.C., June 1966, 161 pp.

The background, research methods, analysis and results of a study correlating a synthetic trip distribution technique with a comprehensive home-interview and destination survey are presented. The specific aims of this research were to investigate the effects of reducing home-interview sample size on a gravity model distribution procedure, to investigate different methods of predicting trip productions and attractions, and to study the effects of using these predicted values on a gravity model. The results are presented in tabular form. It is concluded that the smallest sample which produces acceptable results is 400 useable interviews.

H-102

Horn, K. William

AIR CARGO TON-MILES -- A STATISTIC OF GROWING IMPORTANCE. In: Freight Transportation. Highway Research Record, no. 82. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965. pp. 94-99.

Reporting procedures by the airline industry to the CAB and the growth of cargo traffic during recent years are described and shown in the appended Table 1. The airlines carried less than 0.1% of the total inter-city ton-miles in 1963, but this cargo is of high value, consisting of mail and express. They are expected to triple their volume by 1975. As air freight tonnage grows more detailed reporting procedures will be required and eventually tonnage and ton-mile figures by commodity groups will be developed as in the other means of transport.

TABLE 1

DOMESTIC INTERCITY FREIGHT TON-MILES[a]

Year	Tons-Miles (billions)						
	Air[b]	Rail	Truck	Oil Pipelines	Great Lakes	Rivers and Canals	Total
1939	0.01	339	53	56	76	20	544
1940	0.02	379	62	59	96	22	618
1941	0.02	472	81	66	114	27	772
1942	0.04	649	60	76	122	26	928
1943	0.05	736	57	93	115	26	1,031
1944	0.07	747	56	133	119	31	1,086
1945	0.09	691	67	127	113	30	1,028
1946	0.08	602	82	96	96	28	904
1947	0.11	675	102	105	112	35	1,019
1948	0.15	647	116	120	119	43	1,045
1949	0.20	536	127	115	98	42	917
1950	0.30	597	173	129	112	52	1,063
1951	0.34	655	168	152	120	62	1,177
1952	0.31	638	135	170	105	64	1,145
1953	0.37	611	217	170	127	75	1,203
1954	0.38	557	213	170	91	83	1,122
1955	0.49	631	223	203	119	98	1,274
1956	0.58	656	249	230	111	109	1,356
1957	0.69	629	254	223	117	115	1,336
1958	0.70	576	256	211	80	103	1,216
1959	0.85	582	259	227	80	117	1,296
1960	0.89	579	260	229	100	123	1,331
1961	1.0	570	313	233	87	124	1,328
1962	1.3	600	331	236	90	133	1,393
1963	1.3	629	348	245	97	143	1,461

[a] Includes mail ... [illegible] ... and ton-miles; based on data from the Transportation Association of America, Interstate Commerce Commission, and Civil Aeronautics Board.

[b] Includes domestic scheduled and nonscheduled service of the U.S. scheduled airline industry, both passenger-cargo and all-cargo carriers, and the supplemental airlines.

H-103

Horonjeff, R. and Ahlborn, G.

JET TRANSPORTS CHARACTERISTICS RELATED TO AIRPORTS. ASCE Proceedings, vol. 91, (J. Aero-Space Transport Division), no. AT1, Apr. 1965, paper 4301, pp. 33-46.

Jet Transports Characteristics Related to Airports, R.HORONJEFF, G.AHLBORN. ASCE—Proc v 91 (J Aero-Space Transport Div) n AT1 Apr 1965 paper 4301 p 33-46. Changes that have taken place in design of jet transports since they first went into service are examined, particularly with regard to their effect on airports; major factors are runway length, noise, and geometry of taxiways; effect of higher powered engines, improvements in lifting capacity of wing, temperature, and runway gradient on runway length are shown and illustrated with examples; procedure for determining radius of curvature of taxiways is suggested.

H-104

Horstman, W.L.
BARGE DOCKS FOR INLAND WATERWAYS. ASCE-Proceedings, vol. 90, (J. Waterways & Harbors Division), no. WW4, Nov. 1964, pt. 1, paper 4146, pp. 99-126.

Barge Docks for Inland Waterways, W.L. Horstman. ASCE-Proc v 90 (J Waterways & Harbors Div) n WW4 Nov 1964 pt 1 paper 4146 p 99-126. Design of barge dock terminal for handling materials to and from land facilities is discussed; economics of available types of construction are compared, taking into account river bottom conditions, river level fluctuations, and availability of natural materials; governmental functions in control of river operating conditions by system of locks and dams are reviewed as they affect dock design and operation; consideration is given to design of mooring and fendering devices, barge shifters, and mooring hardware.

H-105

Horton, Thomas R., ed.
TRAFFIC CONTROL: THEORY AND INSTRUMENTATION. Plenum Press, New York, 1965.

A collection of papers and articles reporting on the experience gained in several existing systems and discussion of the instrumentation employed in or required for these various approaches. It is divided into three sections: introduction; traffic control instrumentation, theory and practice, which includes mathematical models, computer programming, and simultation; and case studies of large-scale integrated traffic control systems.

H-106

Horwood, Edgar M.
COMMUNITY CONSEQUENCES OF HIGHWAY IMPROVEMENT; DISCUSSION. In: Indirect Effects of Highway Location and Improvements. Highway Research Record, no. 96. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965. pp. 1-7.

A very brief summary of a study which evaluates existing studies of highway economic impact and other community consequences. It is stated that there are gaps in: knowledge of the specialized impacts of highways; refined methodological approaches to impact research; and miscellaneous areas of analysis in the domain of operational problems of highway agencies. Proposed areas of future community-consequences research are: spatially localized and integrated studies; and theoretically oriented models. The author concludes that there is a continuing need for operational studies and for a research program of spatially integrated studies.

H-107

Horwood, Edgar M., C.A. Zellner and R.L. Ludwig.
COMMUNITY CONSEQUENCES OF HIGHWAY IMPROVEMENT. National Cooperative Highway Research Program Report 18. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

Guidelines for highway agencies to follow in considering community consequences of highway improvements are developed through consideration of various types of economic impact studies classified by primary purpose of the highway facility. Averages and range of values for parameters studied in bypass, circumferential and partially limited access highways in large urban areas studies are given, with a critique on the methods used. Then state highway departments were surveyed in order to examine the utility of studies conducted to date and to indicate gaps in knowledge in the area of highway impact analyses. Brief descriptions of three specific studies which reflect new approaches are given. This is the first of five volumes contained within this report, the other four are available on loan from the Highway Research Board. The second covers in detail special studies conducted to go beyond the limits of present available literature, the third, fourth and fifth cover respectively the Automated Indexing System, with possible value in other aspects of highway research with 600 annotated references on this topic, and the Automated Indexes. These are considered to be useful to persons conducting research in the area of nonuser benefits.

H-108

Hosea, Harold R.
THE INTERCITY MOTOR BUS INDUSTRY. In: U.S. Transportation: Resources, Performance and Problems. A collection of papers prepared for the Transportation Research Conference convened by the National Academy of Sciences at Woods Hole, Massachusetts, Aug. 1960. National Research Council. National Academy of Sciences, Washington, D.C., 1961. Publication 841-S. pp. 97-105.

After a historical survey the author surveys current operations: in 1957 there were 19,259 intercity buses operated for 1.291 billion miles. The physical plant, the services rendered, the personnel, research and engineering, the capital invested and the distribution of the revenue dollar are discussed in the light of the most recent available information. The industry potentials and problems (rates, regulation, safety, national emergencies, statistical problems) are reviewed. The author is Director of Research, National Association of Motor Bus Owners.

H-109

Howe, C.W.
METHODS FOR EQUIPMENT SELECTION AND BENEFIT EVALUATION IN INLAND WATERWAY TRANSPORTATION. Am. Geophysical Union. Water Resources Research, vol. 1, no. 1, First Quarter 1965, pp. 25-39.

Methods for Equipment Selection and Benefit Evaluation in Inland Waterway Transportation, C.W.HOWE. Am Geophysical Union. Water Resources Research v 1 n 1 First Quarter 1965 p 25-39. Determination of optimal scale of waterway projects in terms of length, depth, and width; selection by prospective operators of best equipment (boats, barges, and their combination) to be used on particular waterways; functional relationships are provided that permit prior evaluation of effects of waterway scale variables on ton-mile costs of cargo transportation.

H-110

Hutchinson, John W. and T.W. Kennedy
USE OF ACCIDENT RECORDS IN HIGHWAY RESEARCH. Highway Research News, no. 13. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., June 1964. pp. 1-8.

A study was made of the accuracy and completeness of accident reporting to determine whether or not existing accident records could be used in evaluating the past performance of the various types of highway medians now in service in Illinois. Current accident reports were compared with the results of a detailed field investigation of the evidence at the sites of all reported and unreported accidents involving the median. There were great variations in the percentage of median encroachments. It was concluded that existing accident records would be of little use in evaluating the past performance of the various types of medians now in service.

I-001

Illinois.University. Engineering Experiment Station
TRAFFIC LINKAGE PATTERNS BETWEEN A METROPOLITAN AREA AND THE COMMUNITIES WITHIN ITS REGION OF INFLUENCE. University of Illinois. Engineering Experiment Station Bulletin, no. 488. Urbana, Ill., 1966.

Data from the 1958 Champaign-Urbana metrpolitan area traffic study are used to portray patterns of inter-community travel which can be used as the basis for the development of inter-community traffic models. Factors discussed include spatial distribution of regional travel, volume or traffic interaction, and degree of central city dominance as expressed by trip generation. These items are investigated by total as well as by individual trip purpose categories. This area's influence for the generation of regional traffic was found to be of constant size and dependent upon the distance of other competing cities.

I-002

Institution of Mechanical Engineers, London
TRANSPORT IN THE YEAR A.D. 2000. Automobile Division. Institution of Mechanical Engineers, London, England, 1965.

I-003

Irick, P.E. and W.N. Carey, Jr.
THE NEW HIGHWAY RESEARCH INFORMATION SERVICE. In: Highway Research News no. 18. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., March 1965. pp. 5-15.

A description of a new automated storage and retrieval system called the Highway Research Information Service. A general flow chart is given in a figure and the coverage and selection of highway research information in another. A Thesaurus and index terms are being developed.

J-001

James, T.
TO THE AIRPORT - BY RAIL. Transport Age, March 1965, pp. 17-19.

J-002

Jessiman, William, et al.
A RATIONAL DECISION-MAKING TECHNIQUE FOR TRANSPORTATION PLANNING. In: Transportation System Analysis and Evaluation of Alternate Plans. Highway Research Record, no. 180. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967, pp., 71-80.

A technique is presented which treats all pertinent factors of a decision-making problem systematically. The benefits and cost not easily measured in monetary units can be considered simultaneously with those which can be estimated in dollars and cents. The technique involves itemizing the objectives of a project, defining the best measure for each objective, weighting the objectives, evaluating the way each alternative plan meets each objective, and selecting the best alternative. These steps are explained and illustrated using a transit situation as an example. An extension of the technique is presented which makes it feasible to consider a system of possible projects and the optimal allocation of available capital among them. This extension results in a problem which may be solved by integer linear programming techniques. The formulation of this linear programming technique is shown.

J-003

Johnson, J.W. and E.M. Kovitch
FREIGHT CAR DISTRIBUTION-NATURE OF PROBLEM.
Canadian Operational Research Society-J., vol. 1,
no. 1, Dec. 1963, pp. 27-38.

Freight Car Distribution—Nature of Problem, J.W.JOHNSON, E.M.KOVITCH. Can Operational Research Soc—J v 1 n 1 Dec 1963 p 27-38. Study of problems associated with information gathering, analysis and forecasting, planning inventory levels, calculation of car requirements, implementation of movement orders, and evaluation and control of performance was conducted to reduce inventory fluctuations in freight car operations; problem is resolved by separating operating and planning functions; problems in designing control system.

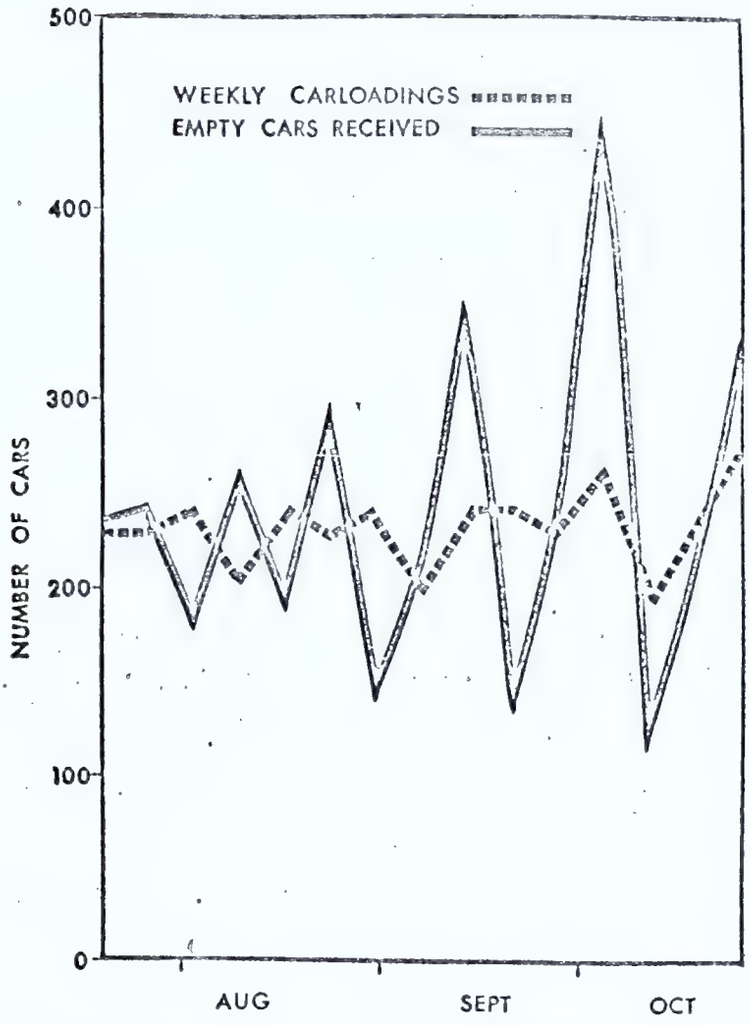


FIG. 2. Cars loaded and empty cars received weekly at a loading point. The figure illustrates the dynamic instability of the supply process.

J-004

Johnson, N.L.
FORECASTING AIRPORT TRAFFIC. ASCE Proceedings, vol. 90, (J. Aero-Space Transport Division), no. AT2, Oct. 1964, paper 4079, pp. 181-195.

Forecasting Airport Traffic, N.L.JOHNSON. ASCE—Proc v 90 (J Aero-Space Transport Div) n AT2 Oct 1964 paper 4079 p 181-95. New terminal facilities should be designed to meet "average peak demand" at their physical half-life; forecast of air traffic is made by Market Analysis Method which is found to be improvement over extrapolations of past traffic and other systems of prediction; using this method, predictions are made of probable demands to be made on Newark (NJ) Airport in 1975.

J-005

Jones, William K.
CASES AND MATERIALS ON REGULATED INDUSTRIES.
Foundation Press, Brooklyn, N.Y., 1967.

J-006

Jorgensen, R.E.
PROGRAMING HIGHWAY ACCIDENT REDUCTION. In: Highway Economics, Highway Research Record, no. 12. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963. pp. 112-123.

Highway accidents were analyzed by studying the highway needs and planning in Kansas, South Dakota and Kentucky. All three had long-range plans for raising the service adequacy of their roads and streets. Kansas and South Dakota produced patterns supporting the conclusions that accidents are reduced in all traffic volume groups by improving highways and that accident rates increase as traffic volume increases. Relationships between types of accidents and road adequacy are given. Considerable increases in safety were found to be associated with increases in the adequacy level of rural state highways.

J-007

Jorgensen, Roy E.
DEFICIENCIES OF URBAN TRANSPORTATION STUDIES. ASCE Proceedings, vol. 91, (J. of the Highway Division), no. HW2, Dec. 1965, paper 4568, pp. 17-25.

The variety of methods being used in different urban transportation studies to answer problems of traffic generation rates and distribution factors makes it difficult to reach conclusions on present technical deficiencies. The lack of standardization as to basic approaches is in itself a deficiency. Technical deficiencies center around inability to accurately forecast land-use and inadequate data systems. Current data is a primary concern of the continuing planning process. Effective organization is critical in some places, as is the lack of trained personnel. Obtaining effective inter-governmental cooperation is still a problem with respect to getting studies initially organized, and making provision for continuous planning.

J-008

Jorgensen,Roy and Associates and Westat Research Analysts, Inc.
EVALUATION OF CRITERIA FOR SAFETY IMPROVEMENTS OF THE HIGHWAY. Roy Jorgensen and Associates and Westat Research Analysis, Inc., (P.O. Box 575, Gaithersburg, Md.)1966. 227 pp.

The need for and the importance of a scientific approach to the programming of highway safety improvements was established by this study. Obviously, highway improvements cannot eliminate all accidents, for many other factors are involved-policing, traffic court administration, driver licensing and other essential safety functions as well as the uncontrollable nature of the individual driver. Substantial accident reduction can be brought about in specific situations by identifying locations and sections of highway that meet a predetermined definition of "hazardous," and then by directing improvements toward these situations. In no other way can safety improvements produce results that will justify the required expenditure of always-limited highway dollars. The conclusions and recommendations resulting from this study are presented.

K-001

Kanwit, Edmond L. and D.M. Glancy.
USE OF METROPOLITAN AREA CENSUS DATA FOR TRANSPORTATION PLANNING. In: Economic Forecasting. Highway Research Record, no. 106. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966, pp. 22-43.

Shows how information on automobile availability and workers' commuting patterns, obtained from the 1960 Census of Population, can be applied in making some of the forecasts needed for sound urban transportation planning. Six characteristics relating to population, employment, and income, the major factors in traffic generation, are used for forecasts of present and future needs for transportation facilities.

K-002

Keefer, Louis E.
URBAN TRAVEL PATTERNS FOR AIRPORTS, SHOPPING CENTERS, AND INDUSTRIAL PLANTS. National Cooperative Highway Research Program Report 24. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966.

The development of airports, shopping centers, industrial plants, and other large generators of urban travel increases traffic volumes and changes traffic patterns on the street networks. The objective of this study was to evaluate the nature of the relationship between the travel patterns and factors such as: travel time characteristics, time distribution characteristics, characteristics of the traffic generator, modes of travel of the generated traffic, competition of similar generators for the same street network, socio-economic characteristics of the area, size, density and degree of development of the area. Airports, serving a large number of workers and visitors in addition to air travelers, can be among the largest single-site trip generators. Metropolitan area residents rely heavily on the automobile to get to the airport. Residents' trips are scattered throughout the metropolitan areas but many visitors' trips are concentrated in the central cities. Work trips follow an industrial pattern and social-recreation trips take place mainly in the evening. Airports are atypical due to differing functions and types of communities served, and ground transportation problems vary. The investigation of shopping centers revealed that the automobile was the only significant form of transport. Trip generation rates are not static, but trip production from households decreases regularly with increasing distance from the shopping center; 75% being shorter than 5 miles. With respect to industrial plant travel, the major manufacturing plant is a major trip generator, with about 95% of the daily tripmaking consisting of trips to work. Appraisal and application of findings, conclusions and suggested research are given. Appendices include an annotated bibliography, summaries of peak traffic data, transportation study travel survey characteristics, etc. Numerous tables, graphs, and statistical data.

K-003

Kent, Malcolm F.
INTERCITY FREIGHT HAULAGE, BY COMMODITY, SHIPPING DENSITY AND TYPE OF TRANSPORT, 1960. In: Freight Transportation. Highway Research Record, no. 82. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965. pp. 1-31.

Data are presented on: tons and ton-miles of freight hauled in the United States in 1960 by commodity groups (Bureau of the Budget classification); tons of freight hauled in the United States in 1960, by shipping density and by carrier (railway, inland waterway, highway, pipe line, or air). An appendix (pp. 10-31) lists commodity tonnages produced and transported in the United States by railways, domestic waterways, and highways in 1960. Pipe line and air line commodity statistics are given at the end. Highway ton-miles are not reported.

K-004

Kiley, Edward V.
LOOKING AHEAD. In: Trucking And The Economy. American Trucking Associations, Inc., Washington, D.C., 1965, pp. 21-30.

The trucking industry's importance to the economy is examined. Usefulness of a current index of intercity truck tonnage as an economic barometer is discussed and statistics are presented to support this premise. Statistics on trucking revenues are also presented. Future trends are explored. Projections for population, income, spending for 1980 are given as well as dollar predictions of increases in equipment and material that the growing trucking industry will require.

K-005

Kilpatrick, T.H.
METRO AIR SUPPORT 1966; A LESSON IN V/STOL POTENTIAL.
Astronautic & Aeronautics, vol. 5, Jan. 1967, pp. 30-32.

In a mock crisis, the FAA's Metro Air Support used various V/STOL aircraft in New York City to demonstrate their potential. This two-day exercise, the first of its kind, was a success in demonstrating that prompt assistance can be provided by air to a stricken metropolitan area during an emergency. Industry representatives present showed interest in potential commercial operations, modifying existing sites to serve a full-time V/STOL landing sites. Mayor Lindsay plans to incorporate a permanent STOL terminal adjacent to the proposed Hudson-side World Trade Center.

K-006

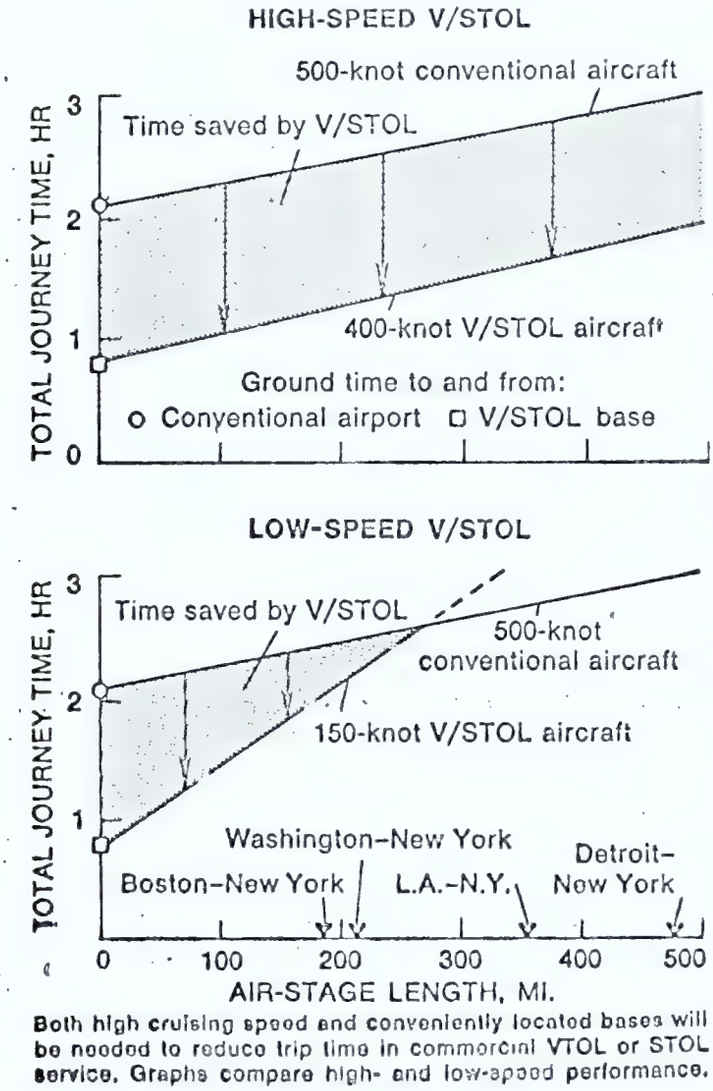
Kloetzli, Jr., W. and L.A. McKee, Jr.
PIGGYBACK EXPRESS. Traffic Quarterly, vol. 20, no. 2, April 1966, pp. 288-97.

The authors propose a system of mass transit based on self-propelled, small, over-the-road vehicles which could be carried piggyback on a two- or three-deck self-propelled railway car, analogously to the delivery of new cars from the factory, except for the innovations of self-propulsion and rapid-loading ramps. By combining road and rail, the system would eliminate railroad stations thus uniting the best advantages of auto and rail travel.

K-007

Kuhn, R.E., M.W. Kelly and C.A. Holzhauser.
BRINGING V/STOLS DOWNTOWN. Astronautics & Aeronautics, vol. 3, no. 9, Sept. 1965, pp. 18-24.

Bringing V/STOLs Downtown, R.E.KUHN, M.W.KELLY, C.A. HOLZHAUSER, Astronautics & Aeronautics v. 3 n 9 Sept 1965 p 18-24. Application of V/STOL aircraft to area of short-haul intercity travel is examined with respect to direct operating costs (DOC); charts show weights for V/STOL, STOL, and conventional aircraft and DOC in terms of field length and aircraft type; factors which tend to reduce V/STOL operational cost are identified and operational problems are outlined; it is shown that success of V/STOL or STOL aircraft in commercial service depends on reducing operating costs and noise levels and on developing suitably located bases with special approach systems for IFR (Instrument Flight Rules) operations.



Both high cruising speed and conveniently located bases will be needed to reduce trip time in commercial VTOL or STOL service. Graphs compare high- and low-speed performance.

L-001

Lakshmanan, T.R. and W.G. Hansen
MARKET POTENTIAL MODEL AND ITS APPLICATION TO A REGIONAL PLANNING MODEL. In: Urban Transportation Planning: Techniques and Concepts. Highway Research Record, no. 102. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965. pp. 19-41.

A description of the formulation, testing, and application of a market potential model used to guide the scale, location, and scheduling of major retail concentrations in a growing metropolitan (Baltimore) area. Two tables, 14 figures, and a 17 item bibliography.

L-002

Lambden, W.
LETTING PASSENGERS CANCEL THEIR OWN TICKETS.
Bus & Coach, vol. 37, no. 6, June 1965, pp. 192-197.

Letting Passengers Cancel Their Own Tickets, W.LAMBDEN. Bus & Coach v 37 n 6 June 1965 p.192-7. Commuters who travel over fairly long distances make up considerable proportion of peak hour traffic on Manchester Corp's routes; experiments were carried out employing one-man-operated 43-seaters for high speed service and use of Holstimatic ticket-canceling machine was introduced by means of which passengers can cancel their own tickets which are bought in bulk at discount; passengers who pay fare to driver board on left side of entrance while people who carry tickets board on right to use machine; layout of Park Royalbodied Leyland Panther Cub; research carried out included study of passenger journey patterns, and times for boarding and alighting, etc.

L-003

Lang, A. Scheffer.
SHIFTING EMPHASIS IN TRANSPORTATION AND ITS IMPLICATIONS FOR RESEARCH. In: Shifting Emphasis in Transportation and its Implications for Research. Highway Research Record, no. 183. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967. pp. 13-18.

The emerging view of transportation is considered to be as a "system" phenomenon with implications for research; making research more important, more innovative and making it live within a complex and systematized institutional framework. Research is fundamental to a "system" concept of transportation because of the complex interactions, social, economic and physical which must be dealt with.

L-004

Lang, E.H.
REVIEW FUNCTION IN WATER RESOURCES DEVELOPMENT. ASCE Proceedings, vol. 92, (J. of the Power Division), no. PO1, Jan. 1966, paper 4622, pp. 39-54.

An historical survey of the review (as opposed to the policy-making, and/or administrative) functions of certain government agencies over the past 150 years;introduces a description of the present (1965) review procedures. Specific examples are given and the agencies listed. The Bureau of the Budget and the Corps of Engineers have the power of review over a number of activities relating to waterways.

L-005

Langley Research Center
A PRELIMINARY STUDY OF V/STOL TRANSPORT AIRCRAFT AND BIBLIOGRAPHY OF NASA RESEARCH IN THE VTOL-STOL FIELD. Langley Research Center, Langley Field, Va. National Aeronautics and Space Administration, Washington, D.C., 1961.

L-006

Lansing, John B.
ISSUES OF ECONOMIC POLICY IN TRANSPORTATION. In: Transportation and Economic Policy. Free Press, New York, 1966. pp. 388-400.

One of the major policy issues in transportation is the extent to which the market mechanism may be relied upon to establish efficient pricing. In the author's view some governmental intervention, in the form of regulation or subsidies is justified, but there seems to be an urgent need to reduce regulation of competition by motor trucks, particularly with respect to establishment of minimum rates. While there is general agreement on the correctness of the user-charge principle, it must be qualified when substantial benefits also accrue to non-users from a given course of action. Investment policies should be subjected to economic analyses, efficient quantitative methods for this purpose being now available; however, the choice of investment alternatives in the public domain should properly result through the political process. Continuation of government subsidies requires continued justification, and the least controversial areas for such subsidies are, at present, in urban mass transportation. Public intervention may also be justified in the field of development and testing of new technology and there seems to be general agreement that the fields of ocean transport and mass transportation are proper choices for such expenditures; but the potentialities of joint as distinguished from the currently fragmented study of the highway-vehicle combination also deserve investigation.

L-007

Lansing, John B.
TRANSPORTATION AND ECONOMIC POLICY. The Free Press, New York, 1966.

Contents include: Economic theory applied to transportation, including the economic functions of transportation theory of investment and rate-making, and problems of organization; transportation in the economic development of the U. S. and other countries; modern transportation in the U. S., including statistical analyses and discussions of various modes of transportation.

L-008

Lansing, John B.
TRANSPORTATION BY WATERWAYS AND PIPELINES. In: Transportation and Economic Policy. Free Press, New York, 1966. pp. 356-373.

The total volume of freight moved along inland waterways is about equal to that moved by oil pipeline and together they account for about one-third of the total intercity freight traffic. When the deep sea domestic movements and shipments to the noncontiguous parts of the U.S. are taken into account, total movement by water becomes easily the larger. The total of 234 billion ton-miles of freight moved along the inland waterways was distributed among the inland systems in 1963 as follows: Atlantic and Gulf coast waterways (21%), Mississippi River including the Ohio and tributaries (35%), Great Lakes system (41%), and Pacific coast waterways (3%). Important bulk commodities carried by water in domestic commerce were: petroleum and its products (42.6%), coal and coke (18.1%), iron ore, iron and steel (8.6%). The investment in waterways is described, as are the St. Lawrence Seaway, the government regulatory bodies, and the economic characteristics of inland water transportation.

L-009

Lathrop, George T., J.R. Hamburg, and G.F. Young.
OPPORTUNITY-ACCESSIBILITY MODEL FOR ALLOCATING REGIONAL GROWTH.
In: Urban Transportation Planning: Techniques and Concepts. Highway Research Record, no. 102. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965. pp. 54-66.

A model is described which attempts to bring into an objective framework methods and concepts which have been commonplace in planning for many years, such as holding capacity, access, and density, but whose application has previously often been subjective and defied replication. The allocation model is based for the most part on access to a regional center or set of regional subcenters. Variables other than access may be introduced by modifying the rank order of opportunities. Qualitative examination of the results of this study indicates that the settlement pattern has historically responded to access in much the way it has been measured by the model. Quantitative verification and calibration are difficult because historical data on the use of land and transportation networks are lacking. The authors are attempting to measure the extent to which population growth since 1940 can be explained by use of the model on the assumption that net activity densities have been fairly constant during this period. It is hoped that the model will lead to a better understanding of the urban growth process. It is intended that activity densities will ultimately be made endogenous to the model.

L-010

Lawler, C.A.
TRENDS IN AUTOMOBILE PARKING AT AIRPORTS. ASCE Proceedings, vol. 90 (J. Aero-Space Transport Division), no. AT2, Oct. 1964, paper 4076, pp. 69-83.

Trends in Automobile Parking at Airports, C.A.LAWLER. ASCE —Proc v 90 (J Aero-Space Transport Div) n AT2 Oct 1964 paper 4076 p 69-83. Facilities at several airports are reviewed and their programs for expansion are detailed; parking programs are aimed at providing as much parking as possible as close as possible to terminal building.

L-011

Lee, G.H.
POSSIBILITIES OF COST REDUCTION WITH ALL-WING AIRCRAFT.
J. Royal Aeronautical Society, vol. 69, no. 659, November 1965, pp. 744-749.

A paper read at a symposium on Cheap Short-Range Air Transport. The author, of Handley Page, Limited, analyzes the whole design problem for the cheap short-range airplane and then gives a detailed description of two specific examples. Drawings show the seating layout, the basic design, and the evolution of the ogee. A table compares the features of the swept all-wing with the conventional aerobus.

L-012

Lee, Mary
ELECTRIC VEHICLES. Science Journal, vol. 3, no. 3, March 1967, pp. 35-42.

The need to develop a small, fumeless car is stimulating research in the electric car. New battery developments, new possibilities of fuel cells or a combination of the two may make the electric car a reality in a very few years. This article discusses the research in progress in this field in England. To date, it is the small firms who have developed prototypes. One potential use of the car is self-service taxies which could be plugged into electric sources which would keep them charged. Drivers possessing special keys could unlock one, use it and return it to some convenient location. The technology to produce electric vehicles for many uses is available. One of the chief problems is to ensure public acceptance.

L-013

Leisch, J.E.
CAPACITY ANALYSIS TECHNIQUES FOR DESIGN OF SIGNALIZED INTERSECTIONS. Public Roads, vol. 34, no. 9, August 1967. Special Issue, "Design capacity charts for signalized intersections."

Installment 1 contains 18 nomographs, charts 1-15 covering general conditions found at 2-way and 1-way intersections under traffic signal control, with instructions for using charts covering various conditions and intersection designs; 16-18 covering the effect of bus stops at intersection and right and left turn lanes with and without signal indication. 34 sample problems are depicted and then solved using the nomographs. Two more nomographs with supplementary charts are to be published in Installment 2 in the October, 1967 issue of this journal. These are for preliminary and fast solutions in terms of over-all intersectional capacity.

L-014

Lessieu, Eugene J.
BUS TERMINAL PLANNING AND DESIGN. Proceedings of the 35th annual meeting of the Institute of Traffic Engineers (Suite 506, 1725 DeSales St. N.W., Washington, D.C. 20036) 1965, pp. 140-149.

Bus transportation, both local and inter-city, is the most widely used form of mass transit. Planning the facilities for bus operation, therefore, becomes of the greatest importance. Where the terminal is located, how it complements other forms of transportation, and its effect on the peripheral traffic all need consideration. Using the Port Authority Bus Terminal in New York as an example, the author discusses these problems in detail.

L-015

Levin, S. M.
AIRCRAFT NOISE, CAN IT BE CUT? Space/Aeronautics, vol. 46, no. 3, August 1966, pp. 65-75.

It can. Blade/vane ratios, the geometry of ducts, the aerodynamics of nacelle and wing, the mating of engine to airframe, all are designers' methods for doing so. But reductions in engine noise may also be accomplished by proper operation. As the noise profiles given in this article show, steeper takeoff and landing can relieve noise significantly. Compression and exhaust, blades and vanes, noise and birds, the possibilities of absorbent lining, and other topics are discussed.

L-016

Levinson, Herbert S. and K.R. Roberts
SYSTEM CONFIGURATIONS IN URBAN TRANSPORTATION PLANNING.
In: Top Issues in Urban Research 1963. Highway Research Record, no. 64. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963, pp. 71-83.

Urban transportation facilities should be planned, designed and operated as a unified system; hence system configuration aspects are analyzed with emphasis on highway networks. The approaches used are: empirical analyses of existing and proposed systems; and travel patterns simulated for a community of nearly 3 million people. One of the major conclusions is that route convergence to areas of high trip density should be avoided. Various principles emerging from this hypothetical study are considered as being relevant, regardless of the ability to quantify them in any given situation. These are: system permanence, system adaptability, continuity of capacity, equalization of lane densities, and provision of a clearly discernible and recognizable pattern.

L-017

Levy, S.L.
SIMULATION OF FREEWAY. U.S. Bureau of Public Roads - Conference on Traffic Surveillance, Simulation & Control, Proceedings, Sept. 14-15, 1964, pp. 166-74.

Simulation of Freeway, S.L.LEVY. U S Bur Pub Roads—Conference on Traffic Surveillance, Simulation & Control—Proc Sept 14-15 1964 p 166-74. Experience with simulation of freeway traffic with respect to ramps has yielded information on needed precision of field traffic flow data, reasonable results for traffic conditions simulated, and anticipated ability to predict flow regimes for ramp configurations. 25 refs.

L-018

Lewis, R.M.
TUBE TRANSPORTATION: A FORWARD LOOK. SAE Journal, vol. 74, June 1966, pp. 36-9.

L-019

Lewis, R.W., E.F. Rosholdt, and W.L. Wilkinson.
A MULTI-MODE TRANSPORTATION NETWORK MODEL. Naval Research Logistics Quarterly, vol. 12, nos. 3 & 4, Sept.-Dec. 1965, pp. 261-274.

This paper describes a comprehensive transportation network model which exploits the special capabilities of large-scale, high-speed computing equipment in the evaluation of large complex transportation schemes. The model was developed to approach the fundamental requirement to compare quantitatively the performance of different transportation force levels against the cost of procuring, maintaining, and operating these force levels. A transportation network comprised of terminals (nodes) and connecting links provides a prototype model within which demands for intermodal transport and the capacity of these links to meet the demand can be compared with each other with respect to performances and costs. The various types of input data (for this problem, which is one of naval logistics) are listed in sufficient detail to make the model usable for civilian purposes.

L-020

Litchford, G. and J.E. Gallagher
SECONDARY SURVEILLANCE RADAR PROVES A BOON TO CONTROLLING HELICOPTER TRAFFIC NEAR AIRPORTS. SAE Journal, vol. 75, March 1967, pp. 92-5.

L-021

Longley, X. James W. and B. T. Goley

A STATISTICAL EVALUATION OF THE INFLUENCE OF HIGHWAYS ON RURAL LAND VALUES IN THE UNITED STATES. In: Indirect Effects of Highway Improvement: 1962. Highway Research Board Bulletin 327. National Research Council. National Academy of Sciences, Washington, D.C., 1962. pp. 21-55.

Statistical techniques applied to previous attempts to evaluate the effect of highway improvement on land values are described. Basic to the analysis are the data collected by the Department of Agriculture for the Bureau of Public Roads on land values by type of road and farming area. Data from some 5,000 rural land sales were standardized and used to determine existing differentials between values of farm real estate, by type of road, as to price per acre, and as to price per farm and distance from nearest trading center. Other relationships of the influences of various types of rural highways on land values are explored. Certain general principles are formulated.

L-022

Los Angeles Chamber of Commerce

NATIONAL CONFERENCE ON PLANNING AND DESIGNING OF URBAN HELICOPTER FACILITIES, 2ND, LOS ANGELES, CALIFORNIA, OCT. 18 - 19, 1962. (Papers) Developed and Sponsored by Los Angeles Chamber of Commerce, 1962.

Papers include: 10 year Outlook for Helicopters; How a Helicopter Flies; Application of the Helicopter; Planning for the Helicopter; Philadelphia's Approach to Municipal Responsibilities in Regard to Heliport Development and Related Helicopter Operations; Approach Taken by a Small City in Formulating Policy Governing Helicopter Landing Facilities; Effect of Real Estate Adjacent to Helicopter Landing Areas; Insurance Considerations - Helicopter Landing Facilities; Presentation on Safety Factors and Considations in Urban Helicopter Operations; Local Safety Considerations; Helistop Sound Levels; Consideration of Helicopter Noise and Rotor Airflow in Heliport Planning; Planning, Designing and Operating Helicopter Facilities, from the Viewpoint of a Helicopter Air Taxi Operator; Financing and Managing Successful Helicopter Facilities; Community Heliport Planning for Scheduled Helicopter Feeder Service; FAA Criteria and Requirements for Helicopter Facilities in the National Airport Plan.

L-023

Lowry, I.S.
METROPOLITAN POPULATIONS TO 1985; TRIAL PROJECTIONS. September 1964. RM-4125-RC.

RM-4125-RC METROPOLITAN POPULATIONS TO 1985: TRIAL PROJECTIONS. I. S. Lowry. September 1964.

A summary of results of two series of demographic trial projections covering each of the 52 largest standard metropolitan statistical areas (SMSA's) in the United States. For each SMSA, the 1960 population is divided into 60 components (age, by sex and color). On the basis of explicit and detailed assumptions (outlined in appendixes) as to birth, death, and migration, the size of each component is estimated at five-year intervals, from 1960 to 1985. Results are compared to national projections prepared by the Bureau of the Census, and to SMSA projections prepared by various local agencies. 88 pp. Illus.

L-024

Lynch, J.T., et al.
PANEL DISCUSSION ON INTER-AREA TRAVEL FORMULAS. In: Traffic Origin-and-Destination Studies; Appraisal of Methods. Highway Research Board Bulletin 253. National Research Council. National Academy of Sciences, Washington, D.C., 1960. pp. 128-138.

The following methods have been suggested to predict the amount of travel: the growth factor method, which projects travel growth patterns on the basis of anticipated growth in different areas; the gravity model, which assumes that travel between two areas depends on their attractive power and the distance between them; Howe's electrostatic field theory of trip attraction; the model used in Chicago, which introduces the concept of intervening opportunities; a multiple regression method of forecasting travel volumes developed by the late Sam Osofsky; a model based primarily on the cost of travel.

M-001

MacAvoy, Paul W. and J. Sloss
REGULATION OF TRANSPORT INNOVATION: THE ICC AND UNIT COAL TRAINS TO THE EAST COAST. Random House, New York, 1967.

M-002

Mackie, David I.
THE NECESSITY FOR A FEDERAL DEPARTMENT OF TRANSPORTATION. Journal of Public Law, vol. 8, no. 1. Emory University Law School, Atlanta, Georgia, 1959.

The Transportation Act of 1940 set the precedent for the Department of Transportation, although it had no single policy with respect to transportation as a whole. The legislative acts controlling the various modes of transportation at the date of this publication are presented. The author states the case for retaining existing agencies-notably the ICC, the CAB and the Maritime Commission. However, agencies which should be transferred to the proposed department are the Bureau of Public Roads, the Inland Waterways Corporation and assistive activities of such agencies as the Board of Engineers for Rivers and Harbors.

M-003

Maddox, C.F. and J.G. McQuaid.
INTERSTATE HIGHWAY SYSTEM SUPER TRANSPORT TRUCK. SAE-Paper 991A for meeting Jan. 11-15, 1965, 23 p.

Interstate Highway System Super Transport Truck, C.F. MADDOX, J.G. McQUAID. SAE—Paper 991A for meeting Jan 11-15 1965 23 p. Concept and design of experimental super transport truck for high-speed, long distance freight hauling on interstate highway system of 1970's, by Ford Motor Co; tractor, powered by 600-hp gas turbine engine, pulls two 40-ft tandem axle trailers at gross combination weight of 170,000 lb; special feature of truck is cab, designed for long-distance, nonstop, two-man operation, it is provided with sleeping accommodations, washroom conveniences, food facilities, and complete heating and air-conditioning system; 13-ft high cab roof is flush with top of trailers, providing substantial aerodynamic advantage; other features.

M-004

Magruder, W.
OPERATION OF SUPERSONIC TRANSPORT AT AIRPORTS. ASCE Proceedings, vol. 90, (J. Aero-Space Transport Division), no. AT2, Oct. 1964, paper 4092, pp. 31-51.

It is shown that supersonic transport will be able to operate from existing airports with only minor modifications of terminal facilities; existing runway lengths and runway taxiway strengths are adequate; Lockheed variable angle nose configuration is shown to have distinct visibility benefits; takeoff and landing performances will be equal to those of subsonic jet transports.

M-005

Malcolm, D.G. and D.R. Earich.
DEVELOPMENT OF AN INTEGRATED HIGHWAY MANAGEMENT SYSTEM. In: Programing and Needs 1963 and 1964. Highway Research Record, no. 87. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965. pp. 124-143.

A management system has been designed for a state highway department to improve the planning, scheduling, and control of operations in the fields of engineering, right-of-way acquisition, and construction. In the development of this system there have been three phases: highway program definition and management system feasibility, system design and initial operational capability, and full-scale implementation and training. The present paper deals mostly with the second phase, although the first phase is outlined. The critical path method (CPM or PERT) was used as the core for developing an integrated management system which would establish targets of performance for each organizational unit, define the manpower required and the money needed, and provide a means of monitoring accomplishments and pointing to potential problem areas before occurrence. The system design is given in some detail and figures supply additional information.

M-006

Maloney, William L.
SHIFTS IN PETROLEUM TRANSPORTATION. In: Freight Transportation. Highway Research Record, no. 82. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965. pp. 94-99.

Although the oil industry uses all forms of transportation: pipelines, tankers, barges, tank cars, and tank trucks, pipelines are unique in that the material moves in one direction only and there is no return pay load. All the forms are indispensable to the industry and, in fact, they often complement each other. Tables show the growth of pipeline milesage and ton-miles from 1938 through 1963 (Table 1 below), different types of pipeline mileage in 1962, barrels of crude and oil products delivered per day in 1961-1964 (Table 4 below), the volume of inter-city ton-miles transported by different modes, shifts in the mode by year from 1938 through 1962 for crude and refined products. Data came from the ICC, the Department of the Interior and from industrial sources.

TABLE 1

GROWTH IN PIPELINE MILEAGE AND TON-MILES

Year	Miles[a]	Ton-Miles[b] (billions)
1938	119,050	64.4
1943	132,149	96.3
1948	151,626	119.6
1953	179,023	169.9
1958	189,982	211.3
1962	204,064	237.7

[a]Of crude, crude gathering and products lines (4).
[b]ICC annual reports.

TABLE 4

VOLUME OF INTERCITY TON-MILES TRANSPORTED

Mode	Ton-Miles (billions)		Percent of Annual Total	
	1952	1962	1952	1962
Railways, steam and electric including mail and express	623.373	599.977	54.98	43.04
Motor vehicles, for-hire and private use	184.106	331.900	16.24	23.81
Waterways, including Great Lakes	168.367	223.089	14.85	16.00
Pipeline (oil)[a]	157.502	237.723	13.89	17.06
Airways (domestic revenue service, including express mail)	0.415	1.182	0.04	0.09
Total	1,133.763	1,393.871	100.00	100.00

[a]Includes crude and product trunk lines and gathering lines.

M-007

Manheim, Marvin L.
PRINCIPLES OF TRANSPORT SYSTEMS ANALYSIS. In: Transportation System Analysis and Evaluation of Alternate Plans. Highway Research Record, no. 180. Highway Research Board. National Accademy of Sciences, Washington, D.C., 1967, pp. 11-20.

Nine principles for the analysis of transportation systems are presented and discussed. The principles are equally applicable to urban transportation, megalopolitan transportation, developing-country transportation, and strategic mobility. The first five principles pertain to the scope of the system; the components of a transportation system, the modes and movements in a system that require consideration, and the nature of a transportation system as a particular form of "market." The second group of four principles pertains to the problems of analysis: the spectrum of potentially available transportation and non-transportation options, the objectives of transportation, and the relevant impacts. A discussion of the application of these principles to the problems of urban transportation and strategic mobility is included.

M-008

Martin, Brian V., F.W. Memott, III, and A.J. Bone
PRINCIPLES AND TECHNIQUES OF PREDICTING FUTURE DEMAND FOR URBAN AREA TRANSPORTATION. M.I.T. Report no. 3. Massachusetts Institute of Technology Press, Cambridge, Mass., June 1961.

A compendium of methods published by others, this research report emphasizes the transportation planning process as a total process with three main phases, which are described in detail: inventories of existing conditions (land use, population, etc.); estimates of future urban area growth (population, economic activity, etc.); and determination of future travel demand (trip generation, modal split, etc.). Special emphasis has been given to those parts of the transportation planning process in which current methods are inadequate.

M-009

Masiello, R.J.
NEXT GENERATION OF SHORTHAUL AIRCRAFT. SAE-Paper 650223 for meeting Apr. 12-15, 1965, 10 p.

Next Generation of Shorthaul Aircraft, R.J.MASIELLO. SAE-Paper 650223 for meeting Apr 12-15 1965 10 p. Advent of supersonic transport makes imperative cooperation of industry and government in developing system of local service air transportation, which will complement speed and service of surface transportation and long range aircraft currently under development for use in 1970's; requirements of next generation short haul aircraft are outlined relating to navigation and landing facilities requiring minimum investment, cabin/cargo configuration, and systems; development of VTOL-STOL aircraft for local service airline applications is urged.

M-010

Massachusetts Institute of Technology.
THE GLIDEWAY SYSTEM: A HIGH-SPEED GROUND TRANSPORTATION SYSTEM IN THE NORTHEASTERN CORRIDOR OF THE UNITED STATES. M.I.T. Report no. 6. The M.I.T. Press. Massachusetts Institute of Technology, Cambridge, Mass. 1965.

Describes a systems approach to stimulate application of existing and future technology to a proposed design for a high speed Glideway system in the Northeast Corridor. It includes: system objectives; a network analysis with a model to predict future travel demand; proposed vehicle designs with power demands and vehicle dynamics; guideway criteria design and surface, tunnel and foundation features; network location, problems, cost analysis, secondary network layout, and implications for growth and development; schedules, including mathematical programming model for optimum scheduling; propulsion and control, including a fundamental design, communications maintenance and toll collecting proposals; interchanges, types and actual proposals; economics of Glideway system, with comparative ticket prices, demand, fixed and long term costs, operating expenses, and secondary network; political implications with criteria for political support, impact on transportation interests, public financing, and administrative feasibility. With numerous tables, maps, and simulation models, and a 943 reference bibliography with index.

M-011

Massachusetts Institute of Technology.
PROJECT METRAN: AN INTEGRATED, EVOLUTIONARY TRANSPORTATION SYSTEM FOR URBAN AREAS. M.I.T. Report no. 8. The M.I.T. Press. Massachusetts Institute of Technology, Cambridge, Mass., 1966.

The formal report of a M.I.T. Systems Engineering course, in which the systems project consisted of the design of an evolutionary, integrated urban transportation system to meet the projected changes in metropolitan development. The proposed system is discussed, and criteria used in design explained. Automation systems for high and low density areas and the urban environment are presented.

M-012

May, Jr., A.D.
EXPERIMENTATION WITH MANUAL AND AUTOMATIC RAMP CONTROL. In: Freeway Operations. Highway Research Board, no. 59. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964, pp. 9-38.

Experimentation with Manual and Automatic Ramp Control, A.D. MAY, Jr. Nat Research Council—Highway Research Board—Research Rec n 59 1964 p 9-38. Development of control plan included identification of critical section, determination of period of time and degree of control, estimation of redistribution of traffic, and re-evaluation of system operations; ramp control consisted of partially closing one on-ramp and metering traffic at second on-ramp; effect on network of freeway ramp control was evaluated on basis of vehicle-minutes and vehicle-miles of travel for each link, route, and for total network.

M-013

McCafferty, J.J.
PIPELINES ARE MAKING BOLD BID FOR BIGGER ROLE IN TRANSPORT. Iron Age, vol. 190, August 2, 1962. pp. 27-8.

A new pipeline will pump gasoline, kerosene, furnace oil and diesel fuel 1600 miles from Texas to New York. Sinclair is experimenting with piped heating oil in Poughkeepsie, N.Y. where 20 houses are being fed fuel by a pipeline from a central storage area where meters record individual amounts used. The coal industry is seeking Federal approval to build its own pipelines. There is a new high purity nitrogen pipeline. Liquefied wood pulp is moved by pipeline from a mill to a paper plant seven miles away. Solids may be transported now and freight may be moved in containers, passengers in capsules. New steels have made some of these things possible and automation has made them more profitable. These advances have caused other forms of transportation to experiment and provide new forms of service.

M-014

McDermott, J.M. and C.H. McLean.
IMPROVING TRAFFIC FLOW AT TRANSFER ROADWAYS ON COLLECTOR-DISTRIBUTOR TYPE EXPRESSWAYS. In: Freeway Operations. Highway Research Record, no. 59. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964, pp. 83-103.

Improving Traffic Flow at Transfer Roadways on Collector-Distributor Type Expressways, J.M.McDERMOTT, C.H.McLEAN. Nat Research Council—Highway Research Board—Research Rec n 59 1964 p 83-103. Analysis of traffic operations on Dan Ryan Expressway on Chicago's south side that features 5-mi section of four depressed traveled ways, two in each direction, with total cross section of either 12 or 14 traffic lanes; crossover connections from express lanes to local lanes, or vice versa, are provided by two-lane transfer roadways at three locations for each direction of travel; operational characteristics at express-to-local transfer roadway were studied and "before" and " after" pavement markings compared.

M-015

McDonald, J.F.
AIRPORT COMPATIBILITY WITH SST - PROBLEMS OF GROUND SUPPORT EQUIPMENT. SAE-Paper 650208 for meeting Apr. 12-15, 1965, 20 p.

Airport Compatibility with SST—Problems of Ground Support Equipment, J.F.McDONALD. SAE—Paper 650208 for meeting Apr 12-15 1965 20 p. Compatibility of supersonic transport with 15 international United States civil airports is examined in principal areas of terminals, passenger handling, and ground support equipment; runway length and pavement strength, and airport and community noise; some new support equipment and facilities will be required; runways and pavement strengths are generally acceptable as they exist today; noise, both in terminal areas and in surrounding community, is expected to be equivalent to or less than that of contemporary subsonic jet transport aircraft.

M-016

McGrath, W.R.
URBAN THOROUGHFARE SYSTEM. Traffic Quarterly, vol. 20, October 1966, pp. 549-60.

The United States Conference of Mayors has formed an Urban Transportation Committee which in turn is served by a Technical Committee of outstanding traffic and transportation engineers. The author is chairman of this Technical Committee and presents some of its recommendations. There is need for a federally aided Urban Thoroughfare System and the arguments for this are presented with supporting statistical data. The proposal for the creation of this agency is accompanied by a description of the six characteristics of the program as well as a formulation of the seven functions of the municipal departments concerned.

M-017

McKain, Walter C.
COMMUNITY RESPONSE TO HIGHWAY IMPROVEMENT. In: Indirect Effects of Highway Location and Improvements. Highway Research Record, no. 96. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 19-23.

A case study portraying the socio-economic effect of the Connecticut Turnpike on eastern Connecticut. The Connecticut Turnpike has improved the economy of eastern Connecticut, increasing employment, wage rates, real estate values, retail sales, and tourist business, although the effect on individual communities was not uniform. The problems due to cultural and occupational background of the people are described.

M-018

McKenna, M.L.

AUTOMATED AIR CARGO TERMINAL, THEORY AND CONCEPT. SAE - 2nd International Forum for Air Cargo. Proceedings May 26-28, 1964, pp. G1-6.

Automated Air Cargo Terminal, Theory and Concept, M.L.McKENNA. SAE—Int Forum for Air Cargo, 2nd—Proc May 26-28 1964 p G1-6. Atlantic Div of Aerojet General Corp is engaged in study, analysis, and design of automatic freight and express sorting and handling systems for transportation terminals; some sorting system designs for parcel post (railroad and post office) are described, procedures of which should be applied to development of automated air cargo terminals; theoretical terminal concept and its principal elements are described; data requirements, determining optimum degree of automation, time sharing, terminal facility requirements and pay-back are covered.

M-019

McPike, A.L.

RECOMMENDED PRACTICES FOR USE IN MEASUREMENT AND EVALUATION OF AIRCRAFT NEIGHBORHOOD NOISE LEVELS. SAE-Paper 650216 for meeting Apr. 12-15, 1965, 9 p.

Recommended Practices for Use in Measurement and Evaluation of Aircraft Neighborhood Noise Levels, A.L.McPIKE. SAE—Paper 650216 for meeting Apr 12-15 1965 9 p. SAE Committee A-21, Aircraft Exterior Noise Measurements, was formed in 1961 to develop recommended practices for use in evaluation of aircraft noise as it relates to airport neighborhood annoyance problems; areas covered include measurement, propagation, prediction and subjective rating of aircraft noise; paper discusses evaluation of aircraft neighborhood noise levels and subjective measures by which comparisons can be made; included in discussion are recommended practices adopted by SAE and those being studied by Committee A-21.

M-020

Memmott, Frederick W. III, B. V. Martin and A. J. Bone.
PREDICTING FUTURE DEMAND FOR URBAN AREA TRANSPORTATION.
In: Urban Transportation; Demand and Coordination.
Highway Research Board Bulletin 326. National Research
Council. National Academy of Sciences, Washington, D.C.,
1962. pp. 69-97.

A summary of a joint M.I.T. - Massachusetts Department of Public Works study. The conclusions emerging are: Transportation planning must be a total process, the principal aspects of which are: inventories of existing conditions, such as land use, population, vehicle ownership, vehicular travel, transportation facilities, and monetary resources; estimates of growth in terms of population, economic activity, vehicle ownership, land use, and the available transportation network; and determinations of future travel demand based on trip generation, modal split, interzonal transfers, and the assignment of traffic to transportation facilities. The feedback from level of service supplied by facilities to traffic demand is stressed. The Study methods are indicated and certain inadequacies of the current planning process are pointed out. An annotated bibliography of 177 items is presented in an appendix.

M-021

Metcalf, K.N.
TRANSPORTATION: INFORMATION SOURCES. Gale Research Co.,
Detroit, 1966.

Metcalf, Kenneth Nolan, 1923–1965.
Transportation: information sources; an annotated guide to publications, agencies, and other data sources concerning air, rail, water, road, and pipeline transportation. Foreword by Charles C. Cain, III. Detroit, Gale Research Co. [1966, °1965]
307 p. 23 cm. (Management information guide, 8)
Z7164.T8M4 1966 016.3805 65-24657

M-022

Meyer, J.R., J.F. Kain and M. Wohl.
RACE AND THE URBAN TRANSPORTATION PROBLEM. In: The Urban Transportation Problem. Harvard University Press, Cambridge, Mass., 1965. pp. 144-167.

The thesis of this chapter is that housing market segregation affects the nature of the urban transportation problem and the appropriateness of various public housing policies. If housing for nonwhite workers is centrally located, as it usually tends to be in U.S. cities, the nonwhite population with centrally located jobs will commute far less far (on the average) than if housing were not segregated. These centrally employed nonwhites thus incur somewhat higher housing costs and lower transportation costs than they would if housing were not segregated. On the other hand noncentrally employed nonwhites find that housing segregation causes them to commute farther and spend more on transport and possibly to pay more for housing. Since central employment is still much more common than noncentral employment among nonwhites, the net transport effect is probably to reduce over-all urban transport requirements of nonwhites. For whites employed at central locations, the hypothesis is reversed: housing segregation increases transportation costs and the centrally employed white thus spends more on transport and less on housing than he would if the housing market were racially unconstrained. These hypothesis imply that whites pay a price for housing segregation in higher transport costs, but only if they are centrally employed. Nonwhites probably spend less on urban transport than they would freely choose to if their housing choices were not constrained. The costs of serving the urban transport needs of nonwhites are probably further reduced by housing segregation causing considerable reverse commuting (out in the morning, in in the afternoon) that uses capacity that would otherwise be unused. This chapter is a testing, using Detroit and Chicago data from origin and destination studies, of these hypotheses. In general, they were supported by the empirical evidence. Noncentrally employed nonwhites seem to travel relatively long distances to work while noncentrally employed whites usually manage to live reasonably close to their work. Discrimination forces minority groups into a disproportionate amount of cross-hauling and reverse commuting. Ghettos are usually near central business districts and, since more and more workplaces are located at the fringes, more and more Negroes will be travelling in directions opposite the main streams of commuters unless house discrimination is lessened. Income differences partially explain differences in housing patterns, but housing segregation is the main determinant. The obvious and the less probable costs of racial segregation are also evaluated in this chapter.

M-023

Meyer, John R. et al.
THE ECONOMICS OF COMPETITION IN THE TRANSPORTATION INDUSTRIES. Harvard Economic Studies, vol. 107. Harvard University Press, Cambridge, Mass., 1959.

The authors first describe the technical procedures and statistical techniques to be used in their study of the costs involved in railroad, highway and other modes of transportation. After presenting their findings in those areas, they discuss rational allocation of transportation resources. The relative costs of known close competitors for the movement of bulk, high-value, and passenger traffic have been considered and, as a first approximation, traffic has been allocated to any form of transport whose full costs are less than the nearest competitor's marginal or average variable costs. Based on these criteria bulk commodities should move by pipe line or water. High-value commodities should move by rail carload or rail piggyback, both of which have substantial advantages over package freighters and truck. Piggyback operations should probably be used for straight-rail carload movements. Rail passenger transportation is not economical although short-haul, high-density traffic may be an exception. Application of marginal or average cost principles to the various modes indicated that the economic justification of rail and intercity truck transport was doubtful, but that rationalization of railway operations and elimination of uneconomic overhead costs, together with ability to use a pricing policy more closely reflecting marginal costs would result in improvements in the position of the railroads and probable diversion of substantial intercity freight from trucks to railroads. There are other instances where truck costs could be substantially less than rail. Finally, suggestions are made for improving both public and private policies: substantial reduction in regulation and reliance on competition to ensure rates and services in the public interest.

M-024

Michigan, Department of Commerce.
TRANSPORTATION-PREDICATIVE PROCEDURES. Technical Report No. 9. State Resource Planning Program, Michigan Department of Commerce (208 E. Michigan Ave., Lansing, Mich. 48913), Dec. 1966. 4 vols.

In connection with the objectives of the State Resource Planning Program, an extensive study of transportation, both public and private, was undertaken by Michigan. To try to reduce the duplication of planning efforts of different departments, representatives of Administration, Conservation, Highway, and Economic Expansion Departments were asked to take part. The report covers travel by air, water and highways. Pipelines and rail transportation were not treated in great depth through lack of personnel to cover these fields adequately. A summary presents the findings. The other three volumes contain reports of the Aeronautics Commission, the Department of State Highways and the Waterways Division of the Department of Commerce.

M-025

Miller, A.J.
ANALYSIS OF BUNCHING IN RURAL TWO-LANE TRAFFIC.
Operations Research, vol. 11, March 1963, pp. 236-47.

A model is proposed for the formation of bunches in rural two-lane traffic. An overtaking rate is defined and estimated from data. The relation between these overtaking rates and various other factors is investigated. It is shown that with the data available, the model provides an exceptionally good fit. Formulas are then derived for the rate of delay to vehicles on rural roads caused by restricted overtaking. The model is not recommended for the analysis of urban traffic. For urban traffic, it is suggested that variance/mean ratios provide a useful measure of bunching.

M-026

Miller, R.H.
LONG RANGE POTENTIAL OF VTOL AIRCRAFT. ASCE Proceedings, vol. 91, (J. Aero-Space Transport Division), no. AT2, Oct. 1965, paper 4487, pp. 13-28.

One factor limiting VTOL aircraft has been the very large increases in thrust required for vertical as opposed to horizontal takeoff; hence the need for additional power which increases weight, reducing the payload to economically impractical values. The other factor has been the difficulty in handling aircraft at close to zero airspeed, although VTOL's independently controlled horizontal and vertical volocities have a potential for improving safety of flight and permitting an all-weather capability. Although attractive for short haul air transportation, the operating costs for VTOL make it impractical, though long haul transportation can be provided at costs competitive with ground transportation. The possibilities of VTOL supersonic transport and VTOL launchers for space flight are discussed.

M-027

Miller, R.H.
V/STOL TECHNOLOGY-PROBLEMS AND PERSPECTIVES.
Astronautics & Aeronautics, vol. 3, no. 9, Sept. 1965, pp. 32-35.

V/STOL Technology—Problems and Perspectives, R.H.MILLER. Astronautics & Aeronautics v 3 n 9 Sept 1965 p 32-5. Critical analysis of problems of VTOL aircraft and its potential for full commercial or military use; factors considered are payload penalty, handling problems and required hover times, direct operating cost, and problems of maintenance; developments needed in these areas are indicated.

M-028

Miller, Ronald E.
DOMESTIC AIRLINE EFFICIENCY: AN APPLICATION OF LINEAR PROGRAMMING. The M.I.T. Press, Cambridge, Mass., 1963.

Contents include the economics of air transportation, including the nature of airline costs, revenues, market structure and performance; the regulation of air transportation, citing the operation of the Civil Aeronautics Board; the basic formulation of a model, of allocation of planes to routes, solved by means of linear programming; and specific interpretation of the model, together with data sources.

M-029

Mitchell, C.S.
BIG FUTURE SEEN FOR PIPELINES. Chemical & Engineering News, vol. 44, April 25, 1966, p. 23.

Construction of present and future petroleum pipelines is outlined. A large-diameter crude-oil line from the Texas-Louisana Gulf Coast to the Philadelphia refining area is under construction. Future use of slurry pipelines is predicted. Possibilities for such lines are fertilizers, (e.g. beneficiated phosphate rock could be ground at the mining site and pumped to the plant for making superphosphate and phosphoric acid), and iron ore, which could be transported to pelletizing plants at steel mills.

M-030

Moldoff, S.
DEVELOPING A TRANSPORTATION SYSTEM. Technical Information series no. 66SD299. General Electric, Missile and Space Division, King of Prussia, Pa., December, 1966.

A program for the development of an integrated, balanced transportation system is provided, with the Northeast Corridor as an example. As traffic becomes denser and trips longer, efficiency dictates the need for a management sciences approach to transportation in which both the system engineer, and operations analyst are used in decision-making. The various interest groups (travelers, property owners, etc., etc.) in transit planning are listed in detail for evaluation and incorporation in system calculations. The use of models for these purposes is discussed. A conceptual system of transit and a plan for developing it are discussed in the light of political, economic and social facets of the problem. A bibliography and an appendix on Transportation as a Field for Systems Engineering are provided.

M-031

Moldoff, S.
THE PHILADELPHIA TRANSPORTATION SYSTEM, A MODEL FOR 1985. Technical Information series no. 66SD230. General Electric, Missile and Space Division, King of Prussia, Pa. December 1966.

This report is introduced with a discussion of the fundamental problems of urban transportation: the lack of "system," the need for good design, and the implications of access to travel facilities. The second section projects traffic loads to 1985--far enough into the future to permit rational evolution of a system. The model of the system needed to carry that load is then presented in broad brush, with subsystems and interfaces categorized. In Sections 4, 5, and 6 a first cut is made at quantifying some of the most important elements of the system, and in Section 7 the access and transfer problems are examined. Finally, a plan for implementation is outlined. Includes two Appendixes. Appendix A is on the Philadelphia area with 2 charts: "Population Trends" and "Income Distribution by Counties." Appendix B contains 8 tables and 15 charts of selected data from the Penn Jersey Transportation Study.

M-032

Moldoff, S.
THE PROBLEM OF ACCESS TO THE PROPOSED NORTHEAST CORRIDOR HIGH SPEED TRANSPORTATION SYSTEM. Technical Information series no. 66SD340. General Electric, Missile and Space Division, King of Prussia, Pa., Dec. 1966.

The design of access facilities to the Northeast Corridor system will be affected by such attractiveness variables as: cost, speed, safety, convenience, comfort, and dependability; attractiveness being defined as a function of the above independent variables. Controllable variables are defined as line length, station spacings and locations, vehicle speeds, capacities, and headways. Optimum values are calculated for the above. Trip parameters are defined, in relation to feeder systems, as: portal to portal travel time, direct cost, dependability, comfort, convenience and safety. Various access possibilities (e.g. walking, private vehicles, public transportation) are examined in the light of the above variables. The following conclusions are reached (with particular reference to Philadelphia): the high speed line must provide access by providing a sufficient number of suitably placed stations together with efficient interchange with feeder modes. Average station spacings should be in the vicinity of 25 to 32 miles.

M-033

Morin, D.A.
APPLICATION OF STATISTICAL CONCEPTS TO ACCIDENT DATA. Pub. Roads, vol. 34, April 1967, pp. 135-7, 150.

The author points out the necessity for applying statistical concepts to traffic accident data. Although procedures for determining the significance of accident data have already been developed, little has been accomplished toward their application. Procedures are suggested by which the limited available accident data can be analyzed and erroneous conclusions avoided. The importance of statistical analysis of data is illustrated by one State's failure to identify unstable accident rates; high priorities were assigned to some highway sections that had few accidents and low priorities were assigned to other sections that had numerous accidents. Also discussed were the normal chance variation in accident rates, the minimum accident rates that definitely exceed an established tolerable rate, and the percentage of accident reduction needed to establish the reliability of a road section improvement.

M-034

Morris, Ronald E., et al
ECONOMIC IMPLICATIONS OF A UNITED STATES SUPERSONIC TRANSPORT AIRCRAFT UPON AIRPORTS AND ENROUTE SUPPORT SERVICES. VOLUME I, EXECUTIVE SUMMARY. Planning Research Corporation, Los Angeles, California. Dec. 1966. AD 651 657.

This report defines the economic implications to government and local agencies of modifications to airports, terminals, and enroute support facilities as a result of the introduction of a United State supersonic transport aircraft (SST) into scheduled commercial service by United States and foreign carriers. Costs associated with modifications to the ground environment and enroute support services which advanced, high-capacity commercial transport aircraft may require, are identified. Only those improvement programs beyond the normal planning responses to increased traffic and technology advancements are attributed to the larger, faster airliners which will fly within the next 9 years. The costs of these aircraft-sponsored modification programs are allocated among the four competing aircraft: stretched subsonic (DC-8-63); high-capacity subsonics (B-747 and L-500); Concorde; United States SST. This report is divided into four parts. Volume I presents the summary and conclusions of the study of the economic impact of a United States supersonic transport aircraft upon airports and enroute support services; Volume II describes the economic implications of the SST upon airports; Volume III relates the economic implications of the SST upon

enroute support services, and Volume IV provides a discussion of the adequacy of airport pavements for the next generation of commercial aircraft. Contains numerous charts and tables, one of which is reproduced below.

EXHIBIT 1 - SUMMARY OF COSTS OF SST REQUIREMENTS THROUGH 1975

Category	Costs Through 1975 (Millions of Dollars)	Costs Sponsor	SST Unique
Airports and Terminals attributable to Boeing design[1/]	$ 14	$7 FAA (1/2)[2/] $7 Local and state Gov'ts. (1/2)	minimal
Enroute Support Services	$650[3/]		zero
Airways	-		
Navigation	-		
Communications	-		
Meteorology (Operational 1970)	$ 88 invest. $555 O&M (111/yr.)[4/]	U.S. (through Department of Commerce) and participating foreign nations for World Weather Watch system	
Radiation (Operational 1967)	$ 2 invest. $ 4.8 O&M (0.6/yr.)[4/]	NASA - for Apollo Space Radiation Warning Network	

Notes: 1/ Attributable to Lockheed design - $19 million costs thru 1975, $19 million SST unique.

2/ FAAP provides for up to 50 percent federal participation for pavement improvements.

3/ $650 M represents total Enroute Support Services Costs from respective estimated systems operational dates through 1975

4/ A rule-of-thumb has been applied stating that the first two years' O&M costs are approximately equivalent to one year's normal O&M costs.

M-035

Morrow, C.
PLANNING NATIONAL AIRPORT SYSTEM TO SERVE 70'S.
Civil Engineering (NY), vol. 35, no. 8, Aug. 1965, pp. 62-64.

Planning National Airport System to Serve 70's, C.MORROW. Civ Eng (NY) v 35 n 8 Aug 1965 p 62-4. New concept in providing airport system to meet needs of interurban traveler is presented; it is estimated that air traffic will double in 10 yr and triple in 15 yr; future use of air transportation for long-haul passenger traffic will be accelerated by rapid growth in large urban regions; year 1970 will see much more use of helicopters and other V/STOL aircraft.

M-036

Mosher, F.F.
A CAPACITY RESTRAINT ALGORITHM FOR ASSIGNING FLOW TO A TRANSPORT NETWORK. Special Report. ITTE. University of California, Los Angeles, Calif., Jan. 1963.

M-037

Moulton, R.J.
EFFORTS OF INTERGOVERNMENTAL ORGANIZATIONS TO SPEED HANDLING OF AIR CARGO, PARTICULARLY THROUGH CUSTOMS. SAE - 2nd International Forum for Air Cargo. Proceedings May 26-28, 1964, p. P1-8.

Efforts of Intergovernmental Organizations to Speed Handling of Air Cargo, Particularly Through Customs, R.J.MOULTON. SAE—Int Forum for Air Cargo, 2nd—Proc May 26-28 1964 p P1-8. Measures proposed by International Civil Aviation Organization which have to be taken by various governments, airport administrations and carriers, include reduction and simplification of clearance documents, liberal application of sample or selective techniques in clearance examination, provision of adequate handling, clearance and warehousing facilities at international airports and simplified trans-shipment procedures.

M-038

Moyer, R.A. and J.E. Lampe
STUDY OF ANNUAL COSTS OF FLEXIBLE AND RIGID PAVEMENTS FOR STATE HIGHWAYS IN CALIFORNIA. In: Engineering Economy 1963. Highway Research Record, no. 77. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 133-172.

Study of Annual Costs of Flexible and Rigid Pavements for State Highways in California, R.A.MOYER, J.E.LAMPE. Nat Research Council—Highway Research Board—Research Rec n 77 1965 p 133-72. Study provides results for more than 600 solutions of annual costs of pavements in which effect on annual cost of eight major variables is set forth; variables included in study consisted of subgrade quality, traffic indexes for light, medium, and heavy traffic, contract bid prices, interest rates of 3 and 6%, service life of initial pavement, annual costs computed for analysis periods of 26 and 35 yr, average maintenance costs, and total shoulder width of 22 ft and two-lane pavement width of 24 ft.

M-039

Moyer, Ralph A.
COMPREHENSIVE URBAN TRANSPORTATION STUDY METHODS. ASCE Proceedings, vol. 91, (J. of the Highway Division), no. HW2, Dec. 1965, paper 4575, pp. 57-87.

The Federal government plays an important role in urban transportation through two agencies, the Bureau of Public Roads, U.S. Dept. of Commerce, and the Urban Renewal Administration of the Housing and Home Financing Agency by the terms of the Federal-Aid Highway Act of 1962 which also officially recognized the importance of conducting urban transportation studies. The basic steps for conducting urban transportation studies, organization design, geographic design, data collection, data processing, design of transportation systems, public discussion of alternative transportation plans, analysis of methods of financing and implementation of alternative plans, adoption of a master transportation plan, and recommendations for a continuing comprehensive transportation planning process, are each discussed in depth.

M-040

MPC Corporation.
TESTING AND EVALUATION OF THE TRANSIT EXPRESSWAY.
MPC Corporation, Pittsburgh, Pa., Feb. 1967.

A testing and evaluation of the mass transportation demonstration project in South Park, Allegheny County. The report covers a description of the project as installed at South Park; a description of the test and evaluation program designed to determine the engineering, operating, and economic feasibility, and the public acceptance of the Transit Expressway; the observations and results of the test program; and their evaluation. It concludes that this pilot project is a successful demonstration of feasibility of this type of system for metropolitan areas of medium population densities. Further studies, to refine the technology to the point of making preparation of manufacturing specifications for a possible commercial system feasible, are recommended.

M-041

Mueller, E.A.
NEW LOOK AT HIGHWAY CAPACITY. Traffic Quarterly, vol. 20, July 1966, pp. 322-46.

A review of the 1965 publication, Highway Capacity Manual, (Highway Research Board Special Report 87). The original Highway Capacity Manual, long out of print, was published in 1950, sold more than 26,000 copies and was translated into nine languages. The fundamental changes and similarities between it and the new one was summarized. The titles of the chapters in the two are listed in a table both from comparative purposes and to help the user of the new manual in orientation. Each chapter is then discussed.

M-042

Muir, Allan T.
CANADIAN PORTS AND SEAWAY DIRECTORY; INCLUDING UNITED STATES PORTS ON THE GREAT LAKES. 22nd edition. National Business Publications, Ltd., Gardenvale, Quebec, Canada. 1966.

An alphabetical listing of places, with their latitudes and longitudes, products and industries, the port authority (including fees), approaches, formalities, accommodations, and services. Erie, Pennsylvania, is included.

M-043

Mullen, Russell H.
LAND ACQUISITION AND HIGHWAYS: PRESENT IMPACT AND FUTURE PROSPECTS. Right-of-Way, vol. 14, no. 1, Feb. 1967, pp. 54-56.

Acquiring land for urban highways becomes increasingly expensive. It also becomes increasingly rare and the public outcry over the demolition of neighborhoods becomes louder. Present laws demand that the displaced persons be helped with their moving expenses, that a fair market value be paid for their holdings, and that, when necessary, government help should be provided in rehousing them. In spite of this, it is frequently impossible for a householder to buy another house for the money he is given or in the area from which he is moved. It is imperative, therefore, that the highways be planned and built in the underdeveloped areas before they become urbanized and that it be recognized that there is a saturation point in the cities, beyond which highways contribute chaos instead of order.

N-001

National Academy of Sciences.
NEEDED TRANSPORTATION FACTS. In: Conference on Transportation Research; report of a study group convened by the National Academy of Sciences at Woods Hole, Mass., August 1960. National Research Council. National Academy of Sciences, Washington, D.C., 1960, Publication 840, pp. 51-60.

Effective study of transportation, which calls for many types of basic data and statistical information has uncovered new needs for data and gaps in existing information. The Conference concluded that current information was not adequate for scientific examination of the transportation system as a whole, nor its relationships to vital economic, social, political, and defense questions. There will be unforeseen needs for data which will be outside the scope of interest and authority of present data-collection bodies, which are already inadequate. It was recommended that information functions be assigned to a diversified group whose basic purpose would be to understand transport as a whole and to develop suitable information sources.

N-002

National Academy of Sciences.
POTENTIALS FOR TRANSPORT ANALYSIS. In: Conference on Transportation Research; report of a study group convened by the National Academy of Sciences at Woods Hole, Mass., August 1960. National Research Council. National Academy of Sciences, Washington, D.C., 1960, Publication 840, pp. 61-74.

Systems analysis, can be used to dovetail transportation into the larger framework of the national society. This new type of analysis which can be applied to systems of varying size, may be applied to something as complex as the nation's over-all transport system. Systems analysis for transportation characteristically provides perspective with respect to geography and function and time, with cumulative benefits. Examples of systems analysis where several modes have been considered simultaneously are given. Types of models are categorized into four major groups: insight, resource allocation, design, and operations. Trends and applications of systems analysis are discussed.

N-003

National Academy of Sciences.
TRANSPORTATION DESIGN CONSIDERATIONS. Selections from the Proceedings of the Transportation Research Conference of the National Academy of Sciences at Woods Hole, Mass., August, 1960. National Research Council. National Academy of Sciences, Washington, D.C., 1961, Publication 841.

The environmental and institutional framework of transportation is discussed with relation to the federal government and national transportation. Systems engineering and coordination of transportation systems, urban planning, and specific modes of transportation are covered in 31 papers.

N-004

National Association of Motor Bus Owners
BUS FACTS - 34th EDITION - 1966. National Association of Motor Bus Owners, Washington, D.C., 1966.

N-005

National Highway Users Conference
HIGHWAY TRANSPORTATION LEGISLATION IN 1965. National Highway Users Conference, Washington, D.C., 1966.

A summary of federal and state activity.

N-006

National Highway Users Conference
SALES AND USE TAXES AND SIMILAR TAXES AFFECTING MOTOR VEHICLES; A STATE-BY-STATE STUDY. Legislative Reporting Dept. National Highway Users Conference, Washington, D.C., 1964 (rev.)

N-007

National Highway Users Conference
SIZE AND WEIGHT RESTRICTIONS ON TOLL ROADS AND TURNPIKES. National Highway Users Conference, Washington, D.C., 1962.

N-008

National Transportation Action Program Forum
IMPACT OF THE NEW DEPARTMENT OF TRANSPORTATION: AN INDEPTH REPORT OF THE NATIONAL TRANSPORTATION ACTION PROGRAM FORUM, NOV. 10, 1966, IN WASHINGTON, D.C. U.S. Chamber of Commerce, Washington, D.C., 1966.

N-009

The National Waterways Conference, Inc.
WATERWAY TOLLS AND THE STEEL INDUSTRY. In: Issues in Transportation Economics. Karl M. Ruppenthal, ed. Charles E. Merrill Books, Inc., Columbus, Ohio, 1965, pp. 236-244.

Tolls or user charges would place economic burdens on the steel industry. For example, 18 million tons of coal are received by barge. If rail transport were used the cost would be increased by $18.5 million. Parallel figures are given for oil, ore, scrap, stone, and finished products. The total increase for finished products would amount to $96 million annually.

N-010

Nelson, James R.
THE DYNAMIC INTERDEPENDENCE OF TRANSPORTATION COSTS, AND THE RATES OF GROWTH OR DECLINE OF THE VARIOUS MODES OF TRANSPORTATION. In: Transportation Economics. National Bureau of Economic Research, Special Conference 17. National Bureau of Economic Research, New York, 1965, pp. 43-60.

The interactions of prices, costs, rates of growth and their cumulative effects are considered, with special emphasis on the railroads. Historically, the technical origin of interdependence was the existence of a permanent right-of-way under the control of the firm operating the facilities and offering final transportation services to the public. The outstanding single source of decreasing costs was the permanent way. Vertical integration was the source of the price differentiation carried through to the final consumer. No other major form of transportation had these technical resources. Oligopolistic warfare would have been possible between turnpike authorities but the institutional development of the highway industry probably has closed this possibility. Modern methods of freight transport must work within time limits or adhere to schedules something not true of 19th century railroads. The possibility of decreasing costs with additional capital investment is considered. The future of railroads may be foreshadowed by the history of coastal shipping. High terminal costs and slow and unattractive service contribute to the decline in both instances. Public policy should be influenced by the continuous exploration of future solutions with the aid of models which incorporate the interrelationships of cost, demand, price and service. Regulation might be de-emphasized under just those conditions of industrial age and converging industrial problems which seem to make regulation most secure and necessary. Age tends towards inflexibility even without regulation. New competition may require greater flexibility just when regulation induces inflexibility.

N-011

Nelson, W.L.
RECENT PIPELINE-CONSTRUCTION COSTS. Oil and Gas Journal, vol. 64, no. 19, May 9, 1966, p. 127.

A supplement to data given in a previous issue of this Journal. Recent per-mile costs of constructing pipelines are given by diameter in inches from 6 inches through 36. Pipeline-construction cost indexes are given by year for 1934, 1940, and 1945 through 1965 in terms of ICC-system averages and as a function of line size (6, 12, 24, and 30 in.). The indexes average out differences in pipe thicknesses, extreme variations in labor costs, amount of rock encountered, number of river or highway crossings, and the depth of cover or trench. One of a continuing series of cost studies.

N-012

Newell, Gordon F.
STOCHASTIC PROPERTIES OF PEAK SHORT-TIME TRAFFIC COUNTS. Research Report 49. Institute of Transportation and Traffic Engineering, University of California (Berkeley, Calif.), Nov. 1966. 23 pp.

Traffic flow past a point varies with time owing partly to statistical fluctuations and partly to a variation in the mean. Highway traffic surveys frequently include, as a measure of this variation, peak short-time flows (1, 5, or 15-min flows) during a longer time (15, 30, or 60 minutes). Near the peak of the rush hour, the expected flow should be nearly stationary and variation in short-time flows should be due mostly to statistical fluctuations. This paper describes methods for estimation of these peak flows under the assumption that the short-time flows are approximately a stationary Gaussian process with a variance-to-mean ratio of about 1. The theory suggests that one can predict the distribution of peak short-time flows (5-min flows, for example) from the peak long-time flows (15 or 30-min flows). Experimental data seem to confirm this. The implication is that these short-time peaks have no obvious relation to highway capacity beyond that already inferred from the longer-time flows.

N-013

Niedercorn, J.H.
AN ECONOMETRIC MODEL OF METROPOLITAN EMPLOYMENT AND POPULATION GROWTH. October 1963. RM-3758-RC.

RM-3758-RC AN ECONOMETRIC MODEL OF METROPOLITAN EMPLOYMENT AND POPULATION GROWTH. J. H. Niedercorn. October 1963.
A description of an econometric model designed to explain the growth of employment and population in 36 of the nation's largest metropolitan areas. The mode is formulated, estimated, and tested. Forecasts made with it indicate that population and employment growth will be rapid in most of these areas. Central cities will become increasingly specialized in white-collar employment, while blue-collar employment will tend to move to the suburbs. Increased commuter traffic between the central city and its suburbs is likely in a majority of the 36 metropolitan areas. 47 pp. Illus.

N-014

Niedercorn, J.H. and J.F. Kain.
SUBURBANIZATION OF EMPLOYMENT AND POPULATION 1948-1975. January 1963. P-2641.

P-2641 SUBURBANIZATION OF EMPLOYMENT AND POPULATION, 1948-1975. J. H. Niedercorn, J. F. Kain. January 1963.
An analysis of the postwar redistribution of employment and population within 39 of the largest U.S. metropolitan areas. Rapid growth has occurred in the metropolitan ring and only slow growth in the central city. An econometric model indicates that these trends are likely to continue in the future. The significance of these findings for urban development and transportation planning is discussed. 39 pp. Illus.

N-015

Noakes, E.H.
TRANSIT FOR THE HANDICAPPED. Nation's Cities, vol. 5, no. 3, March 1967. pp. 32-33.

Design requirements to allow use of mass transit facilities by handicapped people are outlined. Requirements for stations, rail rapid transit cars, and rapid transit buses are presented. The author states that by including chronic diseases, broken bones and pregnancies as handicaps up to 44% of the population can be considered handicapped.

N-016

Nolen, John Jr.
DEFINING "INTERCITY" FOR TRANSPORTATION PURPOSES. In: Freight Transportation. Highway Research Record, no. 82. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 109-113.

The concept of the "city" as a well-defined geographic or physical entity contained within its political boundaries and of the suburbs as distinct communities is no longer tenable. Today there are compact metropolitan complexes, with the daily activities of the area dominated by interlocking streams of all forms of transportation. The Bureau of the Budget has established the concept of the Standard Metropolitan Statistical Area (SMSA) and, in 1960, the SMSA's contained 63% of the population. Various economic and legal and sometimes contradictory views on the definition of "intercity" are discussed and it is suggested that the term "intercity" is outmoded and "extra-urban" is more applicable, with the SMSA being the most practical geographical unit for statistical study of movement between urban centers.

N-017

Nordlie, P.G.
TO AND FROM AIRPORT. ASME Meeting, June 26-28, 1962. Paper 62-AV-8.

Fundamental problems of airport transportation and major factors involved; relationship between popularity of air travel and characteristics of airport transportation is suggested, and short haul range of air travel identified as sector of market most vulnerable to influence of unsatisfactory airport transportation; new concepts of airport transportation are needed.

N-018

Northwestern University. Transportation Center.
THE COST OF TRUCKING: ECONOMETRIC ANALYSIS, by M.L. Burnstein, A. Victor Cabot, John W. Egan, Arthur P. Hurter, Jr., and Stanley L. Warner. William C. Brown Co., Dubuque, Iowa, 1965.

N-019

Northwestern University. Transportation Center.
CURRENT LITERATURE IN TRAFFIC AND TRANSPORTATION, vol. 8, no. 7. The Transportation Center Library. Northwestern University, Evanston, Illinois. July, 1967.

A monthly guide to materials from current periodicals, books, research reports, etc., acquired by the Transportation Center Library.

N-020

Northwestern University. Transportation Center
TRANSPORTATION GEOGRAPHY RESEARCH. U.S. Army Transportation Research Command, Fort Eustis, Va., 1960.

Evanston, Ill. Transportation Center at Northwestern University.
Transportation geography research. A preliminary report of fundamental research relating to areal distributional aspects of transportation resources, orientated toward the development of transportation forecast methodology. Fort Eustis, Va., U. S. Army Transportation Research Command, 1960.
xiv, 152 p. illus., maps, tables. 28 cm.
HE151.E85 61-60937

0-001

Oberman, Leonard S.
FUNCTIONAL PLANNING OF BULK MATERIAL PORTS. ASCE Proceedings, vol. 91, (J. Waterways & Harbors Division), no. WW2, May 1965, pt. 1, paper 4310, pp. 17-25.

A summary of important new factors to be considered in planning and design of high-capacity dry bulk terminals serving ocean-going vessels. New concepts in material handling methods and equipment make it essential for terminal planners to consider operational procedures, departing from the conventional methods, in order to avoid premature obsolescence of port facilities. These may be best described as the application of mass production techniques to mass transportation of bulk materials. An unconventional terminal design based on a functional approach is shown below; the unit train concept in cargo handling is considered with no classification yards, switching, or delays.

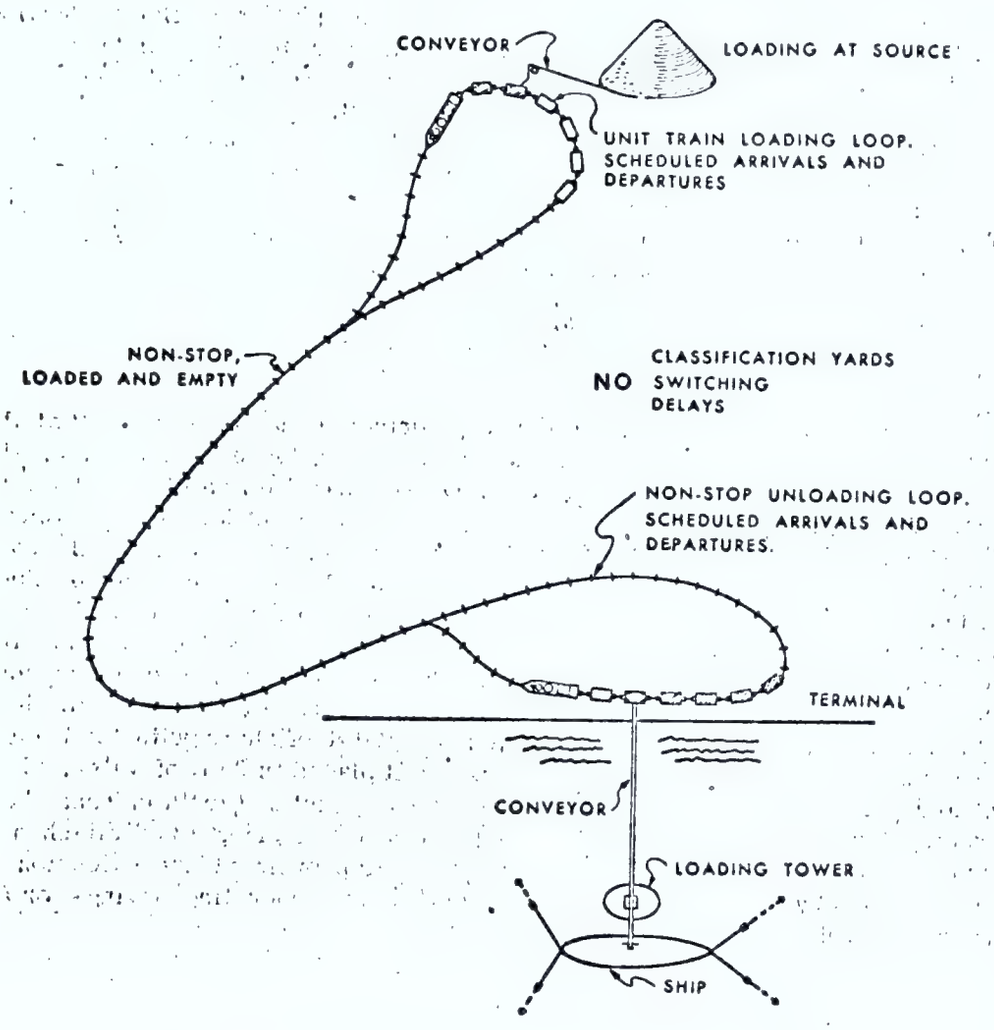


FIG. 4.—DIAGRAM: UNIT TRAIN OPERATION

O-002

O'Brien, J.P.
SUPERSONIC TRANSPORT EFFECTS ON AIR-TRAFFIC CONTROL.
Astronautics & Aeronautics, vol. 4, August 1966, pp. 60-64.

O-003

Oglesby, C.H. and Robert Sargent.
AN ECONOMY STUDY AIMED AT JUSTIFYING A SECONDARY ROAD IMPROVEMENT.
In: Studies in Highway Engineering Economy. Highway Research Board Bulletin 320. National Research Council. National Academy of Sciences, Washington, D.C., 1962. pp. 12-23.

Since many feeder and secondary roads are presently being improved often without determining whether or not the expenditures represent the best use of the funds available, a post-mortem study was made of a 2.935 mile link in San Mateo County, California. One purpose of the study was to see whether or not sound economy studies could be made from data currently available, and if not, what data would be needed. For example, maintenance costs for the old road were lumped in as part of a large road unit and could be segregated only by proportion. The results are given in six tables. The study revealed many voids or uncertainties in the data available and nine suggestions are made to remedy these. The procedure may be used for studying similar situations.

O-004

O'Mara, J.J.
ELECTRONIC GUIDANCE FOR HIGHWAY SAFETY.
Civil Engineering (NY), vol. 34, no. 10, Oct. 1964, pp. 38-40.

Electronic Guidance for Highway Safety, J.J.O'MARA. Civ Eng (NY) v 34 n 10 Oct 1964 p 38-40. Need for research to develop mechanical and electronic controls for cars on arterial roads is emphasized and method of electronic control outlined in which cars would be guided by cables buried in center of lanes, or other cables providing for access, egress, and passing; safe intervals are maintained by electronic devices that can act on engines and brakes; increased use of mass traffic media is also recommended.

O-005

Oppenlander, J.C.
THEORY OF TRAFFIC FLOW-STATISTICAL MODELS. Purdue Univ.-Eng. Extension Ser.-Eng. Bul. 116, 1964, pp. 121-32.

Theory of Traffic Flow—Statistical Models, J.C.OPPENLANDER. Purdue Univ—Eng Extension Ser—Eng Bul 116 1964 p 121-32. Theory of traffic flow is explained and several statistical models are shown that were developed to describe various traffic-stream characteristics; models of statistical estimation and of hypothesis- or significance-testing type are described.

O-006

Overgaard, K.R.
URBAN TRANSPORTATION PLANNING: TRAFFIC ESTIMATION. Traffic Quarterly, vol. 21, April 1967, pp. 197-218.

An outline for the urban transportation planning process with a general description of the four phases in the traffic estimation procedure: trip generation, trip distribution, modal split, and traffic assignment. The author has taken a method (the so-called Wayne Arterial Assignment Method) and applied it to a Danish city. This has been done to examine the Wayne method in general and its relationship to the equal travel times principle in particular. The computer program as actually written from the Danish data deviates somewhat from the Wayne method. The question of whether the Wayne method or its modification do actually reflect the manner in which traffic is distributed over alternate routes is left open. This article is a summary of the author's doctoral dissertation published in full in Acta Polytechnica Scandinavica, Civil Engineering and Building Construction Series no. 37, Copenhagen, 1966.

O-007

Owen, Wilfred
THE METROPOLITAN TRANSPORTATION PROBLEM. The Brookings Institution, Washington, D.C., 1966 (rev.)

A consideration of the problems of metropolitan transportation including the growing demands of the automobile, the role of mass transportation in speeding the movement of urban and suburban dwellers; dealing with the old patterns of urban living and focusing attention on the need for a comprehensive approach to urban mobility. The author examines the problem of urban mobility as a whole and explores some of the inter-relationships between transport development and urban living. The objective is to determine the requirements of public policy by exploring a program of metropolitan-wide planning, financing and coordination of all methods of transportation. It is stressed that attention be focused on the very important need to keep the demand for transportation within bounds by the control of population densities and land uses, and balancing of developed land with open spaces. Hence an effective urban transportation program involves redevelopment of cities and planning of new suburbs to permit urban living to keep pace with changing technology and economic growth.

O-008

Owen, Wilfred
PIPELINE TRANSPORT. In: Strategy for Mobility. The Brookings Institution, Washington, D.C., 1964, pp. 106-109.

The pipeline is particularly practical for traversing difficult terrain and transporting fuels at low unit costs. It is practically unaffected by weather and has few maintenance problems. Operating costs per unit of traffic are one-third as much for a 20-inch pipe as for a 10-inch pipe. Large volumes of liquid with the approximate characteristics of petroleum can be moved through a pipeline at a cost equal to one-third the cost of barge transport, one-fourth to one-eighth the cost of rail transport, and one-sixth to one-eighth the cost of trucking.

O-009

Owings, N.A.
URBAN TRANSPORTATION PLANNING CONCEPTS. Traffic Quarterly, vol. 21, April 1967, pp. 179-83.

A broad-spectrum concept team has been organized by top officials of the transportation agencies of Maryland, the Bureau of Public Roads, and the city of Baltimore. The basic concept under which the team will operate is that of high-density urban mobility, and the program will include the elimination of certain industrial areas in Baltimore which are believed to generate more pollution than taxes, while simultaneously breeding slums and crime. The tools by which the program is to be designed include: application of several psychiatric-oriented disciplines; and coordination of the activities of traffic analysts, engineers, and planner-architects to produce an integrated set of transportation and public and private construction and action programs along some 20 miles of Baltimore-area freeways.

P-001

Pearson, G.B.
V/STOL AIRPORT CUT DELIVERY TIME, INCREASE PRODUCT AVAILABILITY IN 500-MILE RANGE. SAE-Journal, vol. 74, June 1966, pp. 76-7.

P-002

Pegrum, Dudley F.
TRANSPORTATION: ECONOMICS AND PUBLIC POLICY.
R.D. Irwin, Homewood, Illinois, 1963. 625 pp.

Each of the five main sections of this book is designed to be self-contained, although each part is built upon the preceding one to avoid repetition. Part I deals with transportation as an economic activity and with its place in the economy. Part II sets forth basic economic principles and then applies them to an analysis of the structure of the agencies comprising the transportation system of the country and their significance to competition, monopoly, and organization. The pricing process is given special attention. Part III deals with regulation and is presented historically, because present arrangements and policies constitute a continuous development from the beginning of regulation with little discard of what has been done. Details have been kept to the minimum and key issues and the steps taken to deal with them are emphasized. Part IV deals with the issues of private enterprise in transport. An attempt has been made to deal with these objectively. Part V deals with the problems of metropolitan transportation.

P-003

Pendleton, W.C.
EMPIRICAL STUDY OF CHANGES IN LAND USE AT FREEWAY INTERCHANGES.
Traffic Quarterly, vol. 19, no. 1, Jan. 1965, pp. 89-100.

Empirical Study of Changes in Land Use at Freeway Interchanges, W.C.PENDLETON. Traffic Quarterly v 19 n 1 Jan 1965 p 89-100. Use of aerial photographs in assembling data on changes in land use, is discussed and findings from study of land development around 64 freeway interchanges is presented; data are also used to illustrate and test simple model incorporating variables expected to be useful in explaining observed rates of change; study was limited to interchanges on highways designed and constructed with full access control.

P-004

Penn Jersey Transportation Study
1975 PROJECTIONS; FOREGROUND OF THE FUTURE. PJ Reports, vol. 2. Penn Jersey Transportation Study, Philadelphia, Pa. 1964.

The second of a series of general reports for the Penn Jersey region. It presents the short range transportation plan, considers the questions of urban growth and policy, the functions of long and short range planning, and describes forecasting methods. It shows: detailed projections of population, income, and employment; land development in the region; regional distribution of future growth under such aspects as residential development, district income projection, non-residential land development. Numerous maps, charts, and tables are available in addition to appendices containing land-use projections.

P-005

Penn Jersey Transportation Study
1975 TRANSPORTATION PLANS. PJ Reports, vol. 3. Penn Jersey Transportation Study, Philadelphia, Pa. 1965.

The third of a series of general reports concerning transportation in the Trenton-Philadelphia-Camden region. The 1975 geographic, socio-economic, demographic and land-use projections (vol. 2), were used to forecast the structure of 1975 travel patterns and travel demands. Six alternative transportation plans are presented for consideration, including highway and mass transportation facilities, public and private. The methods by which these plans were developed and the tests used to determine the most adequate regional transportation system are given. An evaluation of 1975 plans follows.

P-006

Penn Jersey Transportation Study
P J PAPERS. NOS. 1-23. Penn Jersey Transportation Study, Philadelphia, Pa. Various dates. 1960-1965.

A series of 23 working and policy papers of which the following contain material of potential interest to the investigations of the Governor's Committee for Transportation and its contractors:
no. 18 - Regional Data
no. 22 - Report on the Activities Allocation Model
no. 23 - The Economic Context of 1985 Transportation Costs in the PJ Region

P-007

Penn Jersey Transportation Study.
POPULATION PROJECTION SYSTEM. Technical Report, no. 3.
Penn Jersey Transportation Study, Philadelphia, Pa., 1965.

A population projection system is described in this report which produces projections by age, race, and sex groups for five year time intervals as far in the future as desired, and distributes these to subareas within the region for which base period data are available. It requires appropriate age-sex data for subareas over at least one census decade, and regional or national birth and mortality data for the same groups. The system is programed for digital computer and a number of program options permit experimentation with alternative sets of assumptions respecting birth and death rates, migration, and distributional tendencies between subareas.

P-008

Penn Jersey Transportation Study
THE STATE OF THE REGION. PJ Reports, vol. 1. Penn Jersey Transportation Study, Philadelphia, Pa. 1964.

A comprehensive survey of the state of the Penn Jersey region, a nine-county metropolitan area centered around the cities of Camden, Philadelphia and Trenton (Philadelphia, Delaware, Chester, Montgomery and Bucks counties in Pennsylvania; and Camden, Mercer, Burlington and Gloucester counties in New Jersey). Its history and background, topography, detailed data on socio-economic characteristics, demography, amount and nature of travel, and the transportation facilities in the region (with emphasis on the rail and highway systems as of 1960) are presented. Its purpose was to provide facts and inter-relationships of today's region for extrapolation to 1975 and eventually beyond. Numerous maps, tables, charts and statistics are available.

P-009

Pennsylvania Department of Highways.
1972 TO 1985 NEEDS STUDY FOR PENNSYLVANIA; AN ENGINEERING STUDY OF HIGHWAY NEEDS FOR PENNSYLVANIA FROM 1972 TO 1985. Department of Highways, Commonwealth of Pennsylvania, Feb. 1967.

Future highway needs are projected for Pennsylvania highway systems (10 classes) annually, from 1972 to 1985. Estimated expenditures are presented for the various categories of highway improvement, i.e., relocation, reconstruction, widening, and resurfacing. Annual travel figures are projected and expressed as millions of vehicle miles at five-year intervals from 1967 to 1985. The predicted annual travel in 1985 will be about double that of 1967 for all systems. Maps and projections of travel are provided for each class of highway system.

P-010

Pennsylvania Department of Highways.
SIX YEAR IMPROVEMENT PROGRAM, JULY 1, 1967 - JUNE 30, 1973, vol. 1. Department of Highways, Commonwealth of Pennsylvania, 1967.

The Pennsylvania State Highway Commission recommended: renewal of the Six Year Program for 1971-72 and 1972-73 in the amount of $1.35 billion for highway improvement projects; an increase of $120 million over previous authorizations, for the elimination of hazardous conditions and the improvement of school bus routes; and an additional increase of $30 million to provide for increased costs of projects. The financial plan is presented by district and analyzed by source, rate, and revenue. The appendix provides an inventory of suggested highway improvements.

P-011

Pennsylvania Department of Highways.
SIX YEAR IMPROVEMENT PROGRAM, JULY 1, 1967 - JUNE 30, 1973, vol. 2. Department of Highways, Commonwealth of Pennsylvania, 1967.

The projects recommended for the Six Year Improvement Program are identified. 8,500 projects with a total cost of over $13.4 billion are suggested for immediate programming. $1.3 billion of the $13.4 billion inventory of Suggested Highway Improvements have been selected for the new Fifth and Sixth years of the continuous Six Year Improvement Program. The projects from the initial Six Year Program that are not under construction are called Carry-Over Projects. Each district is analyzed as to the Carry-Over Program and the New Fifth and Sixth Year Program and information: county, traffic route, name and location, type and length of improvement, and cost in millions of dollars is given. A map of the district plotting the various programs is provided.

P-012

Pennsylvania Department of Highways.
SIX YEAR IMPROVEMENT PROGRAM, JULY 1, 1967 - JUNE 30, 1973, vol. 3. Department of Highways, Commonwealth of Pennsylvania, 1967.

A complete survey of all State highways to identify hazardous locations has identified accident cluster locations, hazardous school bus routes, and other hazardous locations, identified by district engineers. A Safety Improvement Program, requiring the expenditures of $111 million of the requested $120 million over a three year period, is presented, broken down by district and by the factors previously cited. An appendix lists the projects by district.

P-013

Pennsylvania Department of Highways.
THE U.S. DEPARTMENT OF TRANSPORTATION: A STUDY OF ITS CREATION, ORGANIZATION AND RESPONSIBILITIES. Harrisburg, Pennsylvania, Aug. 16, 1967.

Agencies and functions transferred out of other Federal governmental units into the Department of Transportation are listed. The organization and the responsibilities of the constituent offices and agencies are shown in a chart. Federal agencies having regulatory functions in this area are listed as are the standing committees of Congress. Biographical information of key personnel is given. President Johnson's message to Congress of March 2, 1966 proposing the creation of a Department of Transportation is summarized and the Act creating it is traced through its hearings and final passage. A number of states have initiated or taken action in the field of transportation: California, Hawaii, New Jersey and Wisconsin have already created state Departments of Transportation. New York has passed legislation to form such a department with the stated aim that planning and development of efficient transportation facilities will be coordinated by the Department with responsibility for balanced transportation policy and planning. The organizational structure of New Jersey's Department of Transportation is described.

P-014

Pennsylvania Economy League
IMPROVED TRANSPORTATION FOR SOUTHEASTERN PENNSYLVANIA. Prepared for Pennsylvania Department of Commerce and Study Commission of the Philadelphia Metropolitan Area. Bureau of Municipal Research and Pennsylvania Economy League, Philadelphia, 1960. 468 pp.

This study includes the physical, historical and legal background for the area covered including the road plan itself and the deficiencies of Pennsylvania's laws which hinder highway development, the principal defect being that our highway laws are cast upon a framework of responsibility according to arbitrary political divisions. The elements of good road planning and the actual procedures followed for state, federally aided, suburban county, city of Philadelphia, municipal, and regional planning agencies are described. Interaction between the road system and mass transportation is considered under the aspect of mass transit using road systems, commuter railroad service, government revenues and expenditures attributable to mass transportation, the tax situation, and coordination of road and mass transportation planning. The pattern of construction and maintenance of southeastern Pennsylvania highway facilities followed by the state and by the suburban counties is discussed under the aspects of physical inventory, legal base, financing and equipment. A local 5-area study (covering 9 municipalities in Southeast Bucks, 6 in Greater Norristown, 13 in East Central Delaware, 6 in Greater West Chester, and 7 in Central Chester) of road construction and maintenance procedures and the state, suburban, local and Philadelphia pattern for financing road programs, considering the legal base, source of revenue, and expenditures, is given. Appendices include a statutory source digest of source materials on Pennsylvania Highway Law as of Jan. 1, 1959 and statistical data on roads in southeastern Pennsylvania, together with 40 tables giving detailed information on these topics.

P-015

Pennsylvania Economy League.
PARKING IN PHILADELPHIA'S NEIGHBORHOODS; A STUDY OF POLICIES AND STANDARDS FOR RESIDENTIAL PARKING FACILITIES IN PHILADELPHIA. Pennsylvania Economy League (Eastern Division) in association with the Bureau of Municipal Research, Philadelphia, Pa., 1966.

A study of the parking problem in Philadelphia, with valuable appendices that include statistics on: 1960 Philadelphia car ownership, relationship between household income and car ownership, residential density and car ownership, availability of mass transportation and car ownership; U.S. car ownership as related to income 1949-63, car registrations in Philadelphia between 1946 and 1963, the Penn-Jersey Study forecast of automobile ownership in Philadelphia, distribution of Philadelphia's parking problems in 1962 by census tract; summary of provisions of the Philadelphia zoning code of 1962 with respect to off-street residential parking; car ownership by types of housing; cost and utilization of city parking facilities in residential areas.

P-016

Pennsylvania Economy League.
TRANSPORTING PUPILS TO THEIR SCHOOLS. Pennsylvania Economy League (Eastern Division) in Association with the Bureau of Municipal Research. Report no. 343. Philadelphia, 1967.

A study of three different ways of transporting pupils made for the Philadelphia Board of Education. School District ownership, maintenance and operation of all equipment was the first possibility; full performance on a contract basis was the second; and a mixed operation (in any proportion) was the third. The estimated costs for these various means of providing services are given. The advantages and disadvantages of each variation are discussed.

P-017

Pennsylvania Economy League.
URBAN TRANSPORTATION IN PENNSYLVANIA. Pennsylvania Economy League, State Division. Harrisburg, Pennsylvania, December, 1966.

Presents an analysis of the transit facilities of strictly urban mass transportation in Pennsylvania, including the two commuter railroads, 3 bus-rail combinations and 77 bus carriers, of which only the 35 in the state which have revenues in excess of $100,000 a year and which do over 97% of the urban mass transit business in the state are analyzed in detail. Statistics given show that the decline in mass transit ridership may be leveling off and that, although ridership is declining, revenues have increased slightly due to increases in fares. Fixed-route scheduled service accounted for 95% of the income of the local transit systems, excluding railroads, in 1964. An analysis of financial statistics for the system indicates that the urban mass transit industry is not financially able to avoid further reductions in service nor to attract the capital with which to rebuild itself. Among the problems of the industry is that nearly half of the buses in the state (excluding PTC) are over 15 years of age and many of the smaller bus companies buy either some or all of their buses in used condition. Wages and salaries account for more than 60% of the operating costs of the companies and this ratio is rising. Urban transit facilities are subject to Federal, state and local taxes as well as PUC assessments. While tax relief for the operators in Pennsylvania is being considered and some reductions have occurred, a well thought out and equitably planned aid program is thought able to provide more help. Reduced rates for school children are regarded as a burden and bus companies complain that the practice of separating responsibility for public and school transportation prevents them from getting contracts which would be useful to them and also hinders the cause of mass transportation planning. Planning for mass transportation in the state is apparently limited almost exclusively to the Philadelphia and Pittsburgh areas of the state. Responsibility for programs is divided

among many state agencies: The Department of Community Affairs, Department of Highways, Department of Public Instruction, Public Utility Commission, Pennsylvania Aeronautics Commission, Bureau of Traffic Safety, Bureau of Motor Vehicles, State Police, Pennsylvania Turnpike Commission, State Highway and Bridge Authority. Federal and state assistance funds have been made available and the Federal Government provides funds for acquisition, construction, research and demonstration, and training and scholarship programs. Funds may not be used for current operating expenses. The Commonwealth assists with both capital and operating funds, and both programs require local matching. Local programs are also in existence and several large transit companies have been taken over by public ownership. The authority to act for acquisition of necessary transportation facilities in Southereastern Pennsylvania is lodged in SEPTA. Recommendations of the Committee fall into four groups: organization, planning, financial assistance, special problems. A state level organization, (a department of transportation) to oversee coordinated mass transportation in the state is recommended. It would assume the duties of the Department of Highways and other organizations scattered throughout the state government. Local governments should also be permitted to establish county or inter-county departments of transportation. The program should be set up to take full advantage of the federal programs although not dependent upon or copied from them and local financial participation should be a requisite. The elimination of local taxes should be a condition for direct aid. Special transportation problems such as school transportation fares should be set up on a fair and equitable basis and local planning and regulation of traffic must allow free and rapid movement of rapid transit and mass transit vehicles.

P-018

Pennsylvania, General Assembly of.
SENATE BILL NO. 1129: Session of 1967. Introduced by Fleming, R.D., et al. Printer's No. 1308, Pa. 1967.

A bill authorizing the Department of Community Affairs to administer certain grant programs for the betterment of mass transportation systems throughout the Commonwealth. Grants could be made to municipalities, counties or other instrumentalities for studies, research, demonstration projects, purchase of service projects, and capital improvement projects. This bill is titled "Pennsylvania Urban Mass Transportation Assistance Law of 1967." Referred to the Committee on State Government on August 28, 1967.

P-019

Pennsylvania, General Assembly of.
SENATE BILL NO. 1130. Session of 1967. Introduced by Fleming, R.D. et al. Printer's No. 1308, Pa., 1967.

A bill to create the Pennsylvania Transportation Assistance Authority with power to acquire, construct, improve, equip and lease transportation assistance projects, and to fix the rentals, fees and charges for the use thereof. Includes authority to issue and to repay bonds and various other provisions which are related to joint ownership with governmental units, exercise of eminent domain, etc., in pursuit of the major purposes of the bill.

P-020

Pennsylvania. University. Institute for Environmental Studies.
AN INTRODUCTION TO URBAN TRANSPORTATION PLANNING; EMERGING TECHNIQUES AND THEORIES, by Anthony R. Tomazinis. Institute for Environmental Studies. University of Pennsylvania, Philadelphia, Pa., 1967. (mimeographed)

An analysis of urban transportation planning, discussing its evolution and general framework, the emerging techniques and their theoretical settings, including: travel demand analysis, formulation of future alternative systems, evaluation of urban transportation systerms, etc.

P-021

Perle, E.D.
THE DEMAND FOR TRANSPORTATION: REGIONAL AND COMMODITY STUDIES IN THE U.S. Research Paper 95. Dept. of Geography, University of Chicago. (in preparation - April 1967)

P-022

Phillips, Charles F.
THE ECONOMICS OF REGULATION: THEORY AND PRACTICE IN THE TRANSPORTATION AND PUBLIC UTILITY INDUSTRIES. Richard D. Irwin, Inc., Homewood, Illinois. 1965.

After an introduction describing the place of regulated industries in the American economy, the author traces the economic, legal, and administrative concepts of regulation and the theory behind such regulation. The regulated industries are then described as to their structure and history. Regulation and the transportation industry, and public policy and the transportation industry are discussed and there is an appraisal of the concept of regulation.

P-023

Phillips, David K. and Stanley Woolman
SYSTEMS ANALYSIS APPROACH TO PROCESSING OF VEHICULAR TRAFFIC RECORDS FROM CONTINUOUS-COUNT STATIONS. Highway Research News, no. 13. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., June 1964. pp. 55-70.

A description of ADP system used to process traffic counts from a cordon traffic survey system in use in Manhattan. The purpose of the processing procedure is to develop a systems approach to the study of hourly, daily and monthly traffic patterns in addition to selected traffic volume characteristics by geographic areas, by highway systems, by classes of urban streets, by state highway districts, etc. Two other considerations were to permit routine checks for reasonableness of collected data and to provide means for graphic presentations for traffic pattern and research studies.

P-024

Pittsburgh Chamber of Commerce. Urban Transportation Council.
FIRST INTERNATIONAL CONFERENCE ON URBAN TRANSPORTATION; PROCEEDINGS. HELD FEB. 1-3, 1966. Urban Transportation Council. Pittsburgh Chamber of Commerce, Pittsburgh, Pa., 1966.

The official proceedings including addresses and panel discussions at the first International Conference on Urban Transportation. Several of the important topics covered were: needed innovations, including a ligher railway car weighing 15-20% that of existing rapid transit cars, which would operate above ground by computer, carrying 30 or fewer passengers; a panel discussion on the university as a source of research, instruction, and public service in urban planning and the establishment of research centers for this purpose and an announcement of the opening of such a center at Carnegie-Mellon University; first steps towards the solution of transportation problems in particular locations in Atlanta, Pomona, Philadelphia, and St. Louis; and inter-Governmental cooperation for better transit, in the spheres of land use planning and transportation planning.

P-025

Pittsburgh Chamber of Commerce.
SECOND INTERNATIONAL CONFERENCE ON URBAN TRANSPORTATION; PROCEEDINGS. Held April 17-19, 1967. Pittsburgh Conference on Urban Transportation. Pittsburgh, Pennsylvania, 1967.

P-026

Pogust, F., A. Kuprijanow and H. Forster.
MEANS OF LOCATING AND COMMUNICATING WITH DISABLED VEHICLES: INTERIM REPORT. National Cooperative Highway Research Program Report 6. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964.

The nature and the extent of the disabled or stopped vehicle problem is discussed with reference to frequency and causes and their relation to highway types, kind of assistance desired and how this assistance could be rendered. Mathematical models have been developed to relate the available information and to bridge gaps in the data. Existing detection techniques including those involving surveillance by aircraft, passing motorists, or using mechanical,pneumatic, visual, optical, acoustical, infrared, electrical and magnetic principles are discussed. Applications are discussed on various types of highways along with estimated cost. In the appendixes mathematical models are developed for: simplified patrol analysis, patrol post analysis, safety analysis and value to the motorist analysis. (31 figures and 14 tables)

P-027

Port of New York Authority.
A FRAMEWORK FOR TRANSPORTATION PLANNING. In: Metropolitan Transportation - 1980. Comprehensive Planning Office, Port of New York Authority, pp. 3-6.

The history of civilization as shaped by transportation is discussed, emphasizing the impact of technological development. When different modes of transportation are viewed closely, certain common trends can be observed: the values derived from transportation are not limited to those enjoyed by its users; there is a profoundly important dichotomy in transportation: private and public; all forms of transportation must cope with a strong rhythm in demand; all modes of transportation show a wide disparity between high speeds and relatively low costs in interterminal operations, and time consumed and high costs experienced in the terminal areas. The most outstanding trends in the New York Metropolitan Region are growth of population in the outlying areas developed at low land-use density, and decline in the older more densely developed neighborhoods.

P-028

Port of New York Authority.
METROPOLITAN TRANSPORTATION - 1980: A FRAMEWORK FOR THE LONG-RANGE PLANNING OF TRANSPORTATION FACILITIES TO SERVE THE NEW YORK-NEW JERSEY METROPOLITAN REGION. Comprehensive Planning Office. The Port of New York Authority, New York, 1963.

P-029

Prescott, Earl
THE CRITICAL PATH METHOD. Photogrammetric Engineering, vol. 33, no. 3, March 1967, pp. 324-330.

The Critical Path Method (CPM; PERT) for scheduling and project monitoring has the same advantages for photogrammetric mapping as it does in other industries. The system provides a display of all the activities for project planning and for continuous management control for the duration of the project, as well as data which may be needed for compressing work schedules at least cost. Graphic network models help identify the critical elements of an operation, and show how they can best be modified or rescheduled as the work progresses in order to overcome unexpected delays, or take advantage of unexpected early completions. The elements include aerial photography, control surveys, photogrammetric bridging and adjustment, stereoplotting, mosaics, drafting, editing, etc. A computer is used to prepare a monitor report that shows project status.

P-030

Price, N.C.
ASTRA SYSTEM FOR MODERNIZATION OF AIR TRANSPORTATION. Heat Transfer Thermodynamics & Education-Boelter Anniversary Vol., 1964, pp. 404-14.

Astra System for Modernization of Air Transportation, N.C. PRICE. Heat Transfer Thermodynamics & Education—Boelter Anniversary Volume 1964 p 404-14. Astra proposal is aimed at discretely planned steps for institution of invariable, continuous flow network of completely automated transport missile trajectories between urban-center vertiports which contain all ground operations within highly mechanized building, part of which may include number of basement floors; suitable transport missile must have combination of necessary compactness and directionally controllable planing ability in atmosphere; typical Astra vehicle, having VTOL capability, employs wingless, tailless fuselage which is conical at forward end.

P-031

Priest, R.V.
STATISTICAL RELATIONSHIPS BETWEEN TRAFFIC VOLUME, MEDIAN WIDTH AND ACCIDENT FREQUENCY ON DIVIDED-HIGHWAY GRADE INTERSECTIONS. Highway Research News, no. 13. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., June 1964. pp. 9-20.

A total of 975 accidents were tabulated in developing charts that are now used to estimate the number of accidents which will occur at given grade intersections in future periods, to correct for influence of volume differences when comparing one grade intersection accident rate with another, and to correct for influence of traffic exposure when comparing median width with accident frequencies.

P-032

Primakov, Yu. V. and V. M. Fyodorov.
POSSIBILITIES OF USING DIRIGIBLES IN CONSTRUCTION. Monatazhnye i Spetsialjnye Raboty v Stroiteljstve, no. 1, Jan. 1966, p. 1820. Journal of the American Concrete Institute, vol. 64, no. 2, Feb. 1967, p. 111.

This article deals with the advantages of using dirigibles for construction of reinforced concrete and steel structures, for repair of existing works, and for transportation of building materials in general, especially in out-of-the-way places. The advantages of the dirigibles for this type of work are their high lifting power, long cruising range, and maneuverability. They also are capable of hovering in a more stable manner than helicopters. It is particularly noted that dirigibles are useful in overland transportation of very large objects which could not be handled by any other means. Notable advances in the construction of dirigibles has taken place in the United States since the end of World War II. There are freight dirigibles with a payload of 24-300 tons and a range of 800-3000 miles at a cruising speed of 75 mph.

P-033

Prisk, C.W.
WHAT'S WRONG WITH THE BEST HIGHWAYS IN THE WORLD? Pub Works, vol. 97, May 1966, pp. 127-9.

P-034

Pulling, R.W.
INTERCITY TRAVEL CHARACTERISTICS. ASCE Proceedings, vol. 91, (J. Aero-Space Transport Division), no. AT1, Apr. 1965, paper 4296, pp. 1-13.

Intercity Travel Characteristics, R.W.PULLING. ASCE—Proc v 91 (J Aero-Space Transport Div) n.AT1 Apr 1965 paper 4296 p 1-13. Hypothesis is presented and scientific model is proposed to aid engineering planners in forecasting travel between city pairs in United States; it is shown that proximity of one city to another, distance between cities and size of city affect travel; economic factors such as individual worth and city classification, i.e. industrial, marketing, institutional, or balanced, also influence travel.

P-035

Purnell, J.S.
PLANNING TRANSPORTATION FACILITIES TO GUIDE URBAN DEVELOPMENT. Traffic Quarterly, vol. 20, no. 2, April 1966, pp. 277-87.

Demographic statistics are discussed in relation to trends in urban growth and transportation planning. A comprehensive regional planning study by the Southwestern Regional Planning Commission, which examined a number of alternative regional development patterns for a six-county Pennsylvania area in Southwestern Pennsylvania that encloses Pittsburgh, develops approaches that can be applied generally to any urban region in the country. The author states that there are alternatives, which are discussed in depth, to the continuation of low-density suburban growth in regional cities, corridor communities, and regional towns. Common goals and standards for selecting a development pattern are suggested and various alternative regional development patterns are evaluated in terms of these for properly integrated transportation facilities.

P-036

Putman, Stephen H.
MODELING AND EVALUATING THE INDIRECT IMPACTS OF ALTERNATIVE NORTHEAST CORRIDOR TRANSPORTATION SYSTEMS. In: Transportation System Analysis and Evaluation of Alternate Plans. Highway Research Record, no. 180. Highway Research Board. National Academy of Sciences, Washington, D.C., 1967, pp. 81-93.

This paper describes the model system and evaluation techniques used by the Consad Company to evaluate the indirect impacts of alternative Northeast Corridor transportation systems. The impact model system consists of two sub-models: IRIO, an interregional input-output model, and INTRA, an intraregional allocation model. The problems of selecting an evaluation measure are also described. Since the models had not yet been completed, much of the text is devoted to an exposition of alternative evaluation measures and their uses within the overall project.

P-037

Putman, Stephen H.
MODELS FOR DETERMINING INDIRECT IMPACTS OF HIGH SPEED GROUND TRANSPORTATION SYSTEMS; NORTHEAST CORRIDOR. Consad Research Corporation, Pittsburgh, Pa., 1967.

The development of a set of models to determine the interaction between alternate transportation facilities and the economic, demographic and physical environment of the Northeast Corridor both in toto and by subarea is described. The basic conceptual framework involves the comparative advantages for the locations of existing and changing accessibilities brought about by changes in transportation facilities. The logic is simple: to be able to describe the consequences or effects for different regions or subregions, estimates of economic or population activity must be forecast for these areas. Mathematical models are used to make these forecasts. A figure is given which shows the logical sequence of impact measurement and another gives the analytical methods or model types used by areal and effects categories.

Q-001

Quinby, H.D.
MAJOR URBAN CORRIDOR FACILITIES; A NEW CONCEPT. Traffic Quarterly, vol. 16, April 1962, pp. 242-59.

A limited tramline is proposed as an intermediate solution to interurban transportation. It would serve best for short trips (8-20 miles). The tramline could have reserved rights-of-way or use existing streets for all or parts of its route. Examples of similar systems now in existence are given. The proposed tramline would be a three-section articulated vehicle type and could take advantage of any existing grade-separated rights-of-way; in urban cores it could operate in reserved malls or segregated streets. New technology in car design, track construction, and maintenance is described. Car design is discussed in detail. For efficient traffic flow, fares are paid while the vehicle moves. Warrants, capabilities and costs are presented in some detail.

Q-002

Quinby, H.D.
TRANSPORTATION FOR SUPER-REGIONS. Traffic Quarterly, vol. 17, July 1963, pp. 325-40.

R-001

Rapp, J.
COST ALLOCATION REVISITED. Highway Research News, no. 17. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., Feb. 1965, pp. 11-24.

Cost Allocation Revisited, J.RAPP. Nat Research Council—Highway Research Board—Research News n 17 Feb 1965 p 11-24. Critical evaluation and analysis of solutions for dividing costs of highway improvement program between highway users and general public and property owners; types of solutions examined include those dealing with cost allocation between users and nonusers and those dealing with cost allocation among various classes of users.

R-002

Reuss, H.S.
BREAKTHROUGH IN NEW URBAN TRANSPORT SYSTEMS. Traffic Quarterly, vol. 20, Jan. 1966, pp. 21-30.

The Mass Transportation Act of 1964 can only provide help for cities to purchase new buses or subway cars. What is needed is for the Federal Government to sponsor research to develop new systems which will provide the urban population with good public transport. Although the Federal government has appropriated $90 million to develop new modes of highspeed intercity transport and has initiated a program for supersonic air transport which could cost $1 billion, we are not making a comparable effort to develop a system of moving people within our cities rapidly, safely, and efficiently. The author is member of the House from Wisconsin, Fifth District.

R-003

Richard, Hoy A. and J.D. Jones, Jr.
APPLICATION OF MOTOR CARRIER CONTINUOUS TRAFFIC STUDY TECHNIQUES TO THE ASSEMBLY OF INTERCITY FREIGHT TRAFFIC DATA. In: Freight Transportation Economics. Highway Research Record, no. 175. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967, pp. 15-26.

A description is presented of the Southwestern Motor Freight Bureau Continuing Traffic Study of December 1964. Traffic flow analysis reports were compiled from a random sample of approximately 90,000 sampled freight bills, and these reports yielded, in addition to a descriptive analysis of intercity freight traffic movement between metropolitan areas, coefficients for use in estimating total movements of goods by common carriers of general commodities between specified standard metropolitan areas. Four report forms are presented to show the manner in which intercity traffic flow data may be assembled for analysis.

R-004

Richards, E.J. and I.J. Sharland.
HOVERCRAFT NOISE AND ITS SUPPRESSION. Roy Aeronautical Soc.-J., vol. 69, no. 654, June 1965, pp. 387-98.

/ Hovercraft Noise and Its Suppression, E.J.RICHARDS, I.J. SHARLAND. Roy Aeronautical Soc—J v 69 n 654 June 1965 p 387-98. Reference is made to 1963 Wilson "Committee on Problem of Noise" and recommendations made therein referring to Hovercraft are discussed; possible noise sources in Hovercraft include propellers, lifting jet and turbojet efflux, lifting fans, compressers and turbines on turbojet and turboshaft engines, gearbox and transmission systems, and piston engine exhausts; review of research program at Institute of Sound & Vibration Research at Southampton University; examination of noise control principles and design factors reducing noise sources in these areas. 23 refs.

R-005

Richards, Oscar W.
VISION AT LEVELS OF NIGHT ROAD ILLUMINATION XII, LITERATURE 1966. In: Night Visibility. Highway Research Record, no. 179, Highway Research Board, National Research Council, National Academy of Sciences, Washington, D.C., 1967, pp. 61-67.

92 references are given and their major results and findings are discussed. Eye physiology, the effect of auto design, eyeglass design, drugs, and visibility of signs are some of the topics considered.

R-006

Roberts, Merrill J.
TRANSPORTATION COSTS, PRICING, AND REGULATION. In: Transportation Economics. National Bureau of Economic Research, Special Conference 17. National Bureau of Economic Research, New York, 1965, pp. 3-42.

Transport rates should be related to incremental rather than to "full" costs. Rates should be geared to demand conditions rather than to cost allocation formulas. Market-oriented rates pass muster reasonably well in terms of significant economic criteria. They are not inimicable to viable investment levels or to interagency traffic allocations consistent with efficient distribution patterns. Rates not fettered by regulation to full-cost criteria can produce economic results just as satisfactory as those realized from the operation of the price system in the economy generally. Commission regulation is apt to distrust these results and to stifle market forces in key cases by inappropriately gearing competitive rates to fully distributed costs. We need to understand demand better in order to regulate price. Only broad-scale research can help us. We might expect insights then that will allow us to regulate transport prices or not and yet produce tolerably efficient allocations.

R-007

Roberts, P.O. and J.H. Suhrbier
HIGHWAY LOCATION ANALYSIS: AN EXAMPLE PROBLEM. M.I.T. report 5. M.I.T. Press, Cambridge, 1966. 94 p.

New and computer-oriented analyses and techniques have been developed for use in the location, design, and economic study of highway systems. This paper illustrates the use of some of these tools in the location of a short segment of new interstate highway (Interstate Route 495) near Franklin, Massachusetts. The report presents the most significant findings of the study: the decision-making scheme so that certain interrelationships between the various cost-producing variables in the highway link location problem are clearly indicated; methods of maximizing computer use in the performance of engineering analyses for the location and design of highway links; a description of computer models and data presentation techniques available for these analyses; a methodology for dealing with the uncertainty inherent in transportation system problems. The steps in the process included: prelocation planning; procurement of terrain data; the Digital Terrain Model (DTM) location system, and design system; volumetric quantities; structures; pavement; drainage; right-of-way acquisition; highway maintenance costs; vehicle simulation and operating cost system; economic analysis (cost summary of lines, cost breakdown); sensitivity analysis; and a presentation of results. There are numerous illustrations throughout and pullout maps.

R-008

Roberts, Jr., P.O. and J.H. Suhrbier
LINK ANALYSIS FOR ROUTE LOCATION. In: Engineering Economy 1963. Highway Research Record, no. 77. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 19-47.

Link Analysis for Route Location, P.O.ROBERTS, Jr, J.H.SUHRBIER. Nat Research Council—Highway Research Board—Research Rec n 77 1965 p 19-47. Work done by Civil Engineering Systems Laboratory at M.I.T. to develop computer-oriented analysis methods for use in location, design and economic analysis of highway systems is described; methods were used in location analysis of short segment of new interstate highway in eastern Massachusetts to aid in further development and testing of these methods; findings of study are as follows—develops decision-making scheme, demonstrates methods of maximizing computer utilization in performance of economic analyses, describes some of computer models and data presentation techniques, and presents new methods of dealing with transportation systems problems.

R-009

Rogers, A.C.
DOWNTOWN PEDESTRIAN SYSTEM-INTEGRAL PART OF TRAFFIC PLAN. Traffic Eng., vol. 35, no. 4, Jan. 1965, pp. 20-2, 44-7.

Downtown Pedestrian System—Integral Part of Traffic Plan, A.C.ROGERS. Traffic Eng v 35 n 4 Jan 1965 p 20-2, 44-7. Problems associated with conflict between pedestrian and vehicle in downtown traffic are discussed; percentage of land allocated to servicing vehicular features is far out of proportion to use of land for economically productive purposes, namely, functional concentration of employment, residential, recreational, and shopping uses in downtown area; answer to problem may be found in multilevel approach designed to intensify downtown development.

R-010

Ronan, William J.
SHIFTING EMPHASIS IN TRANSPORTATION. In: Shifting Emphasis in Transportation and Its Implications for Research. Highway Research Record, no. 183. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967, pp. 7-12.

A new emphases in transportation discussed are integration of the various modes of transportation into a system;recognition that it is a regional problem requiring cooperation of the various concerned areas and that it so affects the total well-being of the community that its far reaching effects must be foreseen and planned for. Research for a total transportation system requires that technological advances in one mode be carefully examined to see how they can affect the others. Intergovernmental cooperation linking planning research and operations of state, local and Federal agencies must be correlated and better statistical information for planning is seen as necessary. The formation of the Federal and State Departments of Transportation are evidences that efforts are being made in this direction.

R-011

Rothery, R., et al.
ANALYSIS OF EXPERIMENTS ON SINGLE-LANE BUS FLOW. Operations Research, vol. 12, no. 6, Nov.-Dec. 1964, pp. 913-33.

Analysis of Experiments on Single-Lane Bus Flow, R.ROTHERY, R.SILVER, R.HERMAN, C.TORNER. Operations Research v 12 n 6 Nov-Dec 1964 p 913-33. Using pairs of buses theoretical 'car-following' models of single-lane traffic flow are examined for this type of heavy vehicle and found to provide good representation of detailed manner in which one bus follows another; flow characteristics of buses were also determined by using platoons of up to ten buses; approaches respectively showed that single lane of buses form stable stream of traffic and have optimal flow of about 1450 buses/hr at speed of 33 mph for expressway type facility.

R-012

Royer, Jr., J.P.
VIRGINIA'S PROGRAM OF URBAN HIGHWAY PLANNING. Traffic Quarterly, vol. 21, April 1967, pp. 185-95.

Highway needs for all towns and cities of 3,500 population and up have been evaluated as part of a state-wide planning program. Before this many urban projects were built without evaluation of need. The present program still has a number of flaws, but it is the best analysis of urban highway problems yet developed in Virginia. The continuing transportation planning process required by the 1962 Federal Highway Act is now in operation in three study areas with three other continuing processes being established.

S-001

Saunders, A.H.
OPERATIONAL EXPERIENCE AT DULLES AIRPORT. ASCE Proceedings, vol. 90 (J. Aero-Space Transport Division), no. AT2, Oct. 1964, paper 4070, pp. 53-58.

Operational Experience at Dulles Airport, A.H.SAUNDERS. ASCE —Proc v 90 (J Aero-Space Transport Div) n AT2 Oct 1964 paper 4070 p 53-8. Airport was designed to avoid problems experienced at other facilities; land acquired is sufficient for all future expansion and should provide noise barrier for neighboring communities; terminal building is designed to allow passengers to move freely from ground transportation to mobile lounges; first year of operation is described.

S-002

Sawhill, R.B. and K.C. Crandall.
SOME MEASURABLE QUALITIES OF TRAFFIC SERVICE INFLUENCED BY FREEWAYS. In: Traffic and Operations- General. Highway Research Record, no. 49. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964, pp. 30-63.

Some Measurable Qualities of Traffic Service Influenced by Freeways, R.B.SAWHILL, K.C.CRANDALL. Nat Research Council —Highway Research Board—Research Rec n 49 1964 p 30-63. Data is evaluated on travel time and fuel consumption, and traffic volume relief is presented to reflect non-user benefits in form of accessibility; characteristics of benefits in form of travel time, overall speed, delay, fuel consumption, distance, and volume for freeway bypass routes as compared to older business routes are presented; effect on travel time and fuel consumption of speed of operation and traffic volume is analyzed.

S-003

Saylor, R.B.
THE RAILROADS OF PENNSYLVANIA. Industrial Research Report 4, Bureau of Business Research. College of Business Administration. Penn State University, University Park, Pa., 1964.

Each of the 40 line-haul railroads operating trains in the state is analyzed by (1) tracing its development back as a physical property and as a business enterprise; (2) describing its current operations; (3) evaluating its operating and financial record since World War I. A general appraisal of Pennsylvania railroads in the present and future is also presented.

S-004

Schmarsel, P.
TECHNIQUES FOR IMPROVING TRAFFIC FLOW. Traffic Eng. & Control, vol. 6, no. 6, Oct. 1964, pp. 361-4, 368.

Techniques for Improving Traffic Flow. P.SCHMARSEL. Traffic Eng & Control v 6 n 6 Oct 1964 p 361-4, 368. Results of management techniques used for improving traffic flow in towns, limits and possibilities of signal installations, and time/space coordination of multiple-use road surface areas by means of remote controlled illuminated traffic signs are discussed.

S-005

Schultheis, M.A.
STANDARDS IN THE AEROSPACE INDUSTRY. Magazine of Standards, vol. 33, July 1962, pp. 207-8.

The author, Hughes Company representative on the National Aerospace Standards Committee (NASC) of the Aerospace Industries Association, describes the function and scope of the Committee. In the 20 years of its existence it has generated more than 1,350 industry standards and specifications. No flight vehicle or airborne equipment has been in the U.S. inventory since World War II which has not had a considerable number of NASC parts.

S-006

Severy, D.M., H.M. Brink and J.D. Baird.
SCHOOL BUS PASSENGER PROTECTION. Society of Automotive Engineers, (485 Lexington Ave., New York, N.Y. 10017) Paper 670040, Jan. 1967. 165 pp.

Three full-scale collision experiments involving a school bus were conducted using research techniques and engineering methodology designed to provide realistic and objective findings relating to school bus passenger safety. The experiments conducted were (a) a head-on collision between two fully loaded, moderate-sized school buses, each traveling 30 mph; (b) a stationary bus rear-ended by a passenger car traveling 60 mph; and (c) a stationary bus impacted on its right side by a passenger car traveling 60 mph. The following categories relating to passenger injury causation were studied: location and type of impact, structural integrity of vehicles, vehicle size, seat design, type of restraint or force moderator, type of safety glass, passenger size, standing versus seated passenger, passenger kinematics and interactions, forces sustained by passengers and many related factors.

S-007

Shapiro, N. and H. Drell.
COMMUNITY NOISE CHARACTERISTICS OF SUPERSONIC TRANSPORT.
SAE-Paper 650213 for meeting Apr. 12-15, 1965, 6 p.

Community Noise Characteristics of Supersonic Transport, N. SHAPIRO, H.DRELL. SAE—Paper 650213 for meeting Apr 12-15 1965 6 p. Community noise characteristics of subsonic jet aircraft resulted in stringent acoustical objectives for supersonic transport; achievement of 108 PNdb (perceived noise level) takeoff objective constituted significant portion of total design effort on SST; it is possible to provide airplane that produces less community noise than present jets by use of engines with airflows of three to four times that of existing subsonic jet engines, but with low velocities resulting in low jet noise, and by providing aircraft with outstanding takeoff and climb-out performance.

S-008

Shelton, J.R.
INDUSTRIAL ENGINEERING AT PORT OF NEW YORK AUTHORITY.
J. Indus. Eng., vol. 15, no. 5, Sept.-Oct. 1964,
pp. 272-76.

Industrial Engineering at Port of New York Authority, J.R. SHELTON. J Indus Eng v 15 n 5 Sept-Oct 1964 p 272-6. Emphasis is on operational studies using various techniques of traditional operations research, mathematics, statistics, transportation economics, engineering administration and economics; studies have been conducted to develop operations and maintenance cost estimates, to analyze construction plans, to evaluate manpower and maintenance requirements, to determine traffic flow patterns through high level aerial photography, and to study transportation facilities through simulation and waiting-line techniques.

S-009

Siekman, P.W.
UNIT TRAIN FROM CONSUMER'S STANDPOINT. ASME-Paper 65-RR-1
for meeting Apr. 7-8, 1965, 7 p.

Unit Train from Consumer's Standpoint, P.W.SIEKMAN. ASME—Paper 65-RR-1 for meeting Apr 7-8 1965 7 p. Privately owned 7000-ton unit train that is hauling coal from mines to power plants in Pennsylvania is described; this is first train to use equipment especially built for unit coal train; paper discusses factors that were considered in selecting equipment, and outlines benefits and problems involved in ownership and use of unit train.

S-010

Simpson and Curtin.
IMPROVED TRANSIT SERVICES FOR METROPOLITAN ERIE; PREPARED FOR ERIE METROPOLITAN TRANSIT COMMISSION. Simpson and Curgin, Philadelphia, Pa., 1966.

This study includes: an assessment of the present plant of the Erie Coach Company; population projections for Erie and surrounding areas by five year increments to 1990 (shown in the table on the next page); projected land activity and rate of land development for the area; employment projections for 1990, based on the Urban Renewal Programs for the area, showing city and area increases; projected auto ownership through 1990. Some conclusions are that public transport is an important secondary system in Erie and measures should be taken to halt the decline of the system and to supply public funds to support a reasonable level of activity. An eleven point program for implementation of the study includes recommendations for establishing a public transit authority, applying for Federal Assistance for new equipment, improving service and promoting the use of the facility and extension of service into the fast-growing outer areas of the metropolitan region.

TABLE X

POPULATION PROJECTIONS BY 5-YEAR PERIODS

Erie Urbanized Area

Including Population Density per Gross Acre

	City of Erie	Millcreek Township	Harborcreek Township	Lawrence Park Township	Wesleyville Borough	Erie Urbanized Area	Population Density Per Gross Acre		
							City of Erie	Outside City Limits	Total Area
1950	130,803	17,037	7,475	4,154	3,411	162,880	12.61	0.69	2.87
1960	138,440	28,441	10,569	4,403	3,534	185,387	13.35	1.01	3.27
1965	139,100	31,100	11,700	4,800	3,650	190,350	13.41	1.10	3.36
1970	142,500	34,000	12,700	5,100	3,800	198,100	13.74	1.20	3.49
1975	151,500	37,100	13,900	5,500	4,050	212,050	14.61	1.30	3.74
1980	162,700	41,000	15,400	6,000	4,400	229,500	15.69	1.44	4.05
1985	171,200	47,700	17,900	6,800	4,800	248,400	16.51	1.66	4.38
1990	175,000	60,000	28,000	7,000	5,000	275,000	16.87	2.16	4.85

S-011

Slayton, W.L.
URBAN RENEWAL AND MASS TRANSPORTATION PLANNING. Traffic Quarterly, vol. 16, January 1962, pp. 5-13.

The need for cooperation in urban planning is stressed. Urban transportation is only one aspect of the total problem which should be considered as a whole. The conclusion is reached that state governments are the logical places for leadership in urban planning. They can make state development policy, create statewide comprehensive plans, pass legislation permitting interjurisdictional action, act as arbiters and catalysts and provide technical and financial assistance. Federal aids fur urban planning are discussed briefly. Projects of the Urban Renewal Administration, Bureau of Public Roads and the Housing Act of 1961 are outlined.

S-012

Smerk, G.M.
URBAN TRANSPORTATION: THE FEDERAL ROLE, Indiana University Press, Bloomington, 1964.

An analysis of urban transportation and of the role the federal government should play, in the light of the history and present status of urban transportation. Contents include discussions of transport modes and urbanization, the roots of the urban transportation problem and alternative solutions, congestion, the Federal-Aid Urban Highway Program and Federal aid to urban mass transport, the traffic peak and the pricing problem, benefit-cost analysis, and the future role of the federal government.

S-013

Smith, Bob L.
GRAVITY MODEL THEORY APPLIED TO A SMALL CITY USING A SMALL SAMPLE OF ORIGIN-DESTINATION DATA. In: Travel Patterns. Highway Research Record no. 88. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965. pp. 85-115.

The feasibility of using the gravity model was studied, using a small clustered sample of interviews in Hutchinson, Kansas: population, 37,000. The model was used to estimate trip production, trip attraction, and travel time factors. In addition, a gravity model was calibrated using origin-destination productions and attractions and the resulting distribution was used in the comparison of results. Interviews were conducted from 402 dwelling units in 14 selected zones. The complete origin-destination survey was made up of 2,528 interviews obtained from a 20% sample of dwelling units from the 83 zones in the area studied. Although the study was concerned with present traffic rather than with estimating future traffic, the author suggests that the method may be useful for estimating future traffic.

S-014

Smith, G.W.
BENEFIT-COST RATIOS: A WORD OF CAUTION. In: Highway Economics, Highway Research Record, no. 12. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963. pp. 77-90.

The benefit-cost ratio is widely used in the evaluation of capital expenditure proposals for public projects for the purpose of comparing alternative designs. By means of examples, the author cites examples which, he states, reveal fallacies in this method and advises caution because its administration will cause some high-yield projects to be delayed or denied because funds have been exhausted in some low-yield projects.

S-015

Smith, W.S.
TRANSPORTATION PLANNING. ASCE Proceedings, vol. 93, (J. Urban Planning and Development Division), no. UP2, June 1967, paper 5265, pp. 93-143.

A discussion of factors to be taken into account by, and techniques available to, urban transportation planners. Copiously illustrated by examples from numerous studies.

S-016

Smith, Wilbur S.
TRAFFIC AND TRANSPORTATION IN URBAN RENEWAL.
Civil Engineering, vol. 30, Oct. 1960, pp. 45-47.

Urban renewal cannot by itself revitalize a decaying central business district, but needs traffic- and transportation planning to handle the additional load. Conversely various aids to transportation may even exert a negative effect on a city unless coordinated with urban renewal. An example of such coordination is provided by New Haven, Philadelphia, Los Angeles and a number of other cities. Elements entering into a development of a master plan for transportation and urban renewal are listed.

S-017

Smith, Wilbur S.
TRANSPORTATION CENTERS. ASCE Proceedings, vol. 91, (J. Urban Planning and Development Division), no. UP1, July 1965, paper 4396, pp. 19-29.

Advocates a coordinated system of terminals or transportation centers that facilitate the functioning of the transport system by providing simple, convenient, comfortable, fast, and economical opportunities to accomplish a travel mode change. Various statistics are given considering pasenger transportation needs and destinations and travel preferences and how these may be best accommodated through a terminal facility. Drawbacks such as the tendency of such a facility to create pedestrian congestion problems and the large space required are considered. Means of providing quick and easy personnel movement and automation of ticket operations must be parts of any terminal operation. Coordination with suburban centers, with parking provided, can facilitate integration of suburbs with the center city as focal point. Some freight interchange may be provided at off-peak hours in the central terminal but specialized circumferential centers, which can consolidate freight movement into and out of the city and which may be integrated with airfreight movements, are seen able to reduce congestion by reducing urban truck travel.

S-018

Smith, Wilbur S.
URBAN TRANSPORTATION TASKS OF THE FUTURE. ASCE Proceedings, vol. 88, (J. of the Highway Division), no. HW1, May 1962, paper 3120, pp. 21-28.

Strong social and economic forces in urbanized areas of the U.S. create changes in the patterns of land use and population distribution and will have long-range effects on future transportation needs. Highway and transit facilities must be carefully coordinated. Urban transportation needs vary widely but a balance in modes is sought. The determination of the mode of future urban travel is the most difficult aspect of transportation studies. Urban transportation must be a system of transportation, adaptable to change. The individual needs and capacities of each community must be considered. Recasting governmental structures to permit effective transportation planning in large urbanized areas is one of the greatest problems. The professional disciplines must have a plan of cooperation with definition of the role of each agency.

S-019

Smith, Wilbur S., and Associates.
FUTURE HIGHWAYS AND URBAN GROWTH. Wilbur S. Smith and Associates, New Haven, Conn., 1961.

This study analyzes the usage and impacts of the National System of Interstate and Defense Highways, particularly as related to urban areas. It indicates transportation needs of future urban areas, and predicts the use and benefits to be derived from the Interstate system. Appendixes include present and proposed rapid transit facilities in Philadelphia and other cities. Tabular information is presented for Pittsburgh and other study areas on trips, existing and future travel, passenger car use, etc.

S-020

Smith, Wilbur S. and Associates.
PARKING IN THE CITY CENTER. Wilbur Smith and Associates. Under Commission from The Automobile Manufacturers Association, New Haven, Connecticut. May, 1965.

S-021

Soltman, Theodore J.
SELECTED BIBLIOGRAPHY FOR TRANSPORTATION PLANNING. Pittsburgh Area Transportation Study, July 1965 (revised).

Over 1000 entries intended to serve as a guide to various aspects of metropolitan and regional transportation.

S-022

Soros, P.
HIGH CAPACITY SHIPLOADING SYSTEM GEARED TO IMMEDIATE TRAIN TURN-AROUND. ASME-Paper 64-WA/MH-4 for meeting Nov. 29-Dec. 4, 1964, 8 p.

High Capacity Shiploading System Geared to Immediate Train Turn-Around, P.SOROS. ASME—Paper 64-WA/MH-4 for meeting Nov 29-Dec 4 1964 8 p. New coal terminal at Conneaut, Ohio is designed to eliminate railroad car waiting time at port by routing material through ground storage when necessary; ground storage is also utilized to permit continuous railroad operation during winter navigation shutdown on Great Lakes; engineering of system for monthly capacity of 2 million tons, shiploading rate of 7000 tph and 1 1/2-million-ton capacity stockpile, incorporating both bucket-wheel and gravity reclaiming is described.

S-023

Sosslau, Arthur B., K.E. Heanue and A.J. Balek.
EVALUATION OF A NEW MODAL SPLIT PROCEDURE. In: Travel Patterns. Highway Research Record no. 88. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965. pp. 44-68.

The new modal split technique was developed to estimate the 1980 transit requirements of metropolitan Washington, D.C. A two-phase test was conducted. In the first phase the effectiveness of the new modal split procedure was tested for its ability to reproduce a known situation. In the second, sensitivity (ability to reflect changes in input variables) was assessed. The results tended to confirm the usefulness of the procedure but a number of limitations were revealed; these need study before further application. Comments by three transportation planning officers are included.

S-024

Southeastern Pennsylvania Transportation Authority.
SEPTA. SEPACT II-DEMONSTRATION PROJECT. MARKETING REPORT NO. 3. PHILADELPHIA METROPOLITAN AREA REPORT 106 (D): RIDERSHIP SURVEYS OF PENNSYLVANIA RAILROAD COMMUTER LINES-LEVITTOWN, CHESTNUT HILL, MANAYUNK AND PAOLI LINES AND ALL READING RAILROAD COMMUTER TRAINS OPERATING IN SOUTHERASTERN PENNSYLVANIA. Three Volumes. Philadelphia, November, 1966.

This report is in three volumes. Volume I contains the narrative and the findings, volume II the statistical presentation for the Paoli, Manayunk, Pottstown, Norristown, P.R.R. -Chestnut Hill, Reading Co. -Chestnut Hill and Glenside lines; and volume III the statistical presentation for the Quakertown, Doylestown, Lansdale, Hatboro, West Trenton, Newtown and Levittown lines. The surveys were conducted to determine and analyze the current rail travel patterns and number of riders in order to establish a basis with which future comparisons can be made; to predict on the basis of available economic and demographic information the size and extent of the market for each line in order to help determine SEPTA's long-range, regional program; to define the task of developing the market; and to ascertain the number and nature of the problems in the minds of the riders and to evaluate any trends in public acceptance. The railroad lines and the method (postage paid questionnaires) used are described and maps and summaries of findings by each line are provided. In general it was found that the location of the destination in the city determined the choice of the rail carrier when competitive rail service was available. Fare and/or speed did not seem to have the total influence sometimes ascribed to them. Furthermore, the destination in the city governs the choice of travel-to-work mode from suburban areas. Very few traveled by foot or by transit more than 10 minutes away from their arrival point. This time factor apparently exists throughout the region. Most rail users live in rather narrow corridors along the rail lines although there are some predictable angles of approach. Parking facilities are scarce at many locations. Three lines have very high percentages of riders who walk to the station (Manayunk 71.1%, Chestnut Hill P.R.R. 50.9%, and Chestnut Hill Reading 47.6%).

S-025

Speas, R.D. and H.P. Schmidt.
INFLUENCE OF V/STOL AIRCRAFT ON AIRPORT DESIGN. ASCE-Proceedings, vol. 90, (J. Aero-space Transport Division), no. AT2, Oct. 1964, paper 4096, pp. 167-80.

Influence of V/STOL Aircraft on Airport Design, R.D.SPEAS, H.P.SCHMIDT. ASCE—Proc v 90 (J Aero-Space Transport Div) n AT2 Oct 1964 paper 4096 p 167-80. Because in some categories of air transportation, V/STOL aircraft will be much more competitive with fixed wing aircraft in future, they must be considered as factor in airport design; V/STOL operations can be considered for use on short-haul, high-traffic routes; airports for V/STOL aircraft must be located near population centers, which makes them expensive and subject to criticism over resulting noise.

S-026

Speas, R.D. and L. Simpson.
FORECAST OF AIR TRANSPORT FOR 1980. ASCE Proceedings, vol. 88, (J. Aero-Space Transport Division), no. AT1, Aug. 1962, paper 3240, pp. 63-75.

Continued growth in the volume of air travel with further advances in long-range aircraft, for which the SST is specifically designed, will require ground facilities to accommodate aircraft of increased overall dimensions, passenger capacities, fueling requirements, weight, and takeoff and landing distances. Several avenues of aircraft development should be considered: (1) subsonic, (2) supersonic, (3) VTOL, which, because of economic and technical problems, is not considered to be a potential factor by 1980. The economic necessity for increasing airport capacity and aircraft utilization and minimizing ground handling time will affect the design of aircraft handling and operating facilities. Factors are given for the airport planner in preparing for transcontinental air transport of 1980. Graphs indicate historical trends in seating capacity, cruising speeds, dimensions of aircraft, fuel capacity, and runway length.

S-027

Special Study Group on Transportation Policies in the United States.
NATIONAL TRANSPORTATION POLICY; PRELIMINARY DRAFT OF A REPORT PREPARED FOR THE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, UNITED STATES SENATE. (DOYLE REPORT). U.S. Government Printing Office. Washington, D.C., 1961.

A comprehensive report on various aspects of U.S. national transportation policies and trends in transportation including the following: national transportation policy as implied by legislative acts through 1958; transportation trends and projections to 1975; organization of Government for transportation; organization of transportation law; specified items of Senate Resolution 244, including regulation of transportation, government assistance and user charges, ownership of one mode of transportation by another, consolidations and mergers, the future of intercity railroad passenger service, long and short haul, and the provision of public carrier service in rural areas; transportation pricing; and additional specific matters such as taxation of way, Government transportation, private carriage of freight, exemption from regulation, enforcement of economic and safety regulations; urban transportation including the rail commutation problem, requirements of mass transportation by private automobile, planning metropolitan passenger transportation, piggyback and containerization, labor and management in transportation, implication of Government regulation of service, the national rail freight car problem, etc.

S-028

Squire, Harris
WHAT'S NEW IN PIPELINING. Speech at the Transportation Management Program. Stanford University, Stanford, California, June 6, 1965.

A discussion of various new applications of pipeline transportation including transport of butane, propane and ethane gas; solids in the form of slurrys of wood chips, coal or gilsonite; solids in the form of capsules of solid material; "people pipelines" for transporting people at extraordinarily high rates of speed through capsule pipelines. Technological advances made in the industry, e.g. larger diameter pipes, automation of operations, permit new applications for the cheap transport of large volumes of material which other forms of transport could not handle.

S-029

Stanford Research Institute
ECONOMIC PRINCIPLES FOR PRICING AIRPORT SERVICES. Prepared for Air Transport Association, South Pasadena, Calif. Southern California Laboratories, Stanford Research Institute, 1961.

Sound principles for pricing airport services should be based on a differentiation between primary and secondary airport functions. The soundest pricing policy for airport operators rests on the primary product - byproduct theory of pricing. Communities receive significant and increasing benefits as a result of the operations of airports, and they must decide the amount of local subsidy. The most satisfactory method of financing airport development is the type of general obligation bond that requires airport revenue to be earmarked for bond retirment. The actual collection of fees and charges may be assessed to either the airlines or the passengers although the passenger ultimately bears the cost. The lack of a uniform system of accounts makes comparison of costs and revenues of various airports extremely difficult and suggests a need for a uniform system of accounts for airports.

S-030

Stanford University. Graduate School of Business
TRANSPORTATION AND TOMORROW, edited by Karl M. Ruppenthal and Henry A. McKinnell, Jr. Stanford University, Stanford, California, 1966.

S-031

Steger, W.A.
REGIONAL TRANSPORTATION STUDY, SOUTHWESTERN PENNSYLVANIA REGION, by Consad Research Corporation. Pittsburgh, Pa. (in preparation - April 1967)

S-032

Steger, W.A. and F.M. Graves.
INTERVENTION OF COMMONWEALTH OF PENNSYLVANIA IN JOINT APPLICATION FOR MERGER OF THE PENNSYLVANIA RAILROAD COMPANY AND THE NEW YORK CENTRAL RAILROAD COMPANY. Digest of Statement Before the Interstate Commerce Commission. Finance Docket no. 21989. Pittsburgh, Pa., 1963.

The economic effects upon the Commonwealth of the formation of the Pennsylvania-New York Central Transportation Company were analyzed with the aid of a simulation model of the railroad. Input consisted of information about freight carried, physical characteristics, and operations. The methodology of the study consisted of the computer model, background research studies for preparation of inputs and analysis of outputs, and evaluation of claims by proponents and adversaries of the merger. Conclusions of this analysis were: The merger applicants did not examine the specific transportation costs had the Pennsylvania main line been chosen for the bulk of consolidated east-west traffic movements; a detailed study of the option to move consolidated traffic through the State of Pennsylvania must include tabulation of the necessary fixed investments as well as the traffic (transportation) costs that would be associated with this path; estimates of schedule changes to accommodate the traffic that would be flowing east-west should be made, in order to test whether the Pennsylvania option proved suitable for shippers in New York State; the proportion of cost incurred as a result of moving trains over the Pennsylvania mountains should be estimated more carefully than has been the case to date; the correlation, if any, between rail traffic and employment should be more completely explored - no provable damage to industrial development in Pennsylvania, under the proposed New York State option, has been demonstrated, although the industrial "access coefficients" indicated potentially significant comparative advantage to New York industry under this option.

S-033

Steger, Wilbur A.
THE PITTSBURGH URBAN RENEWAL SIMULATION MODEL. Journal of the American Institute of Planners, vol. 31, no. 2, May 1965, pp. 144-150.

This report summarizes the current status of the digital computer simulation model for urban renewal decision-making purposes which is concerned with the various aspects of measurement and prediction of the cumulative effects of urban renewal decisions over time. The four steps in accomplishing this are discussed. Component factor analysis is used. The model consists of over 30 computer routines, the purposes of which are described. Data and information management and policy design are discussed. The need for improvement in construction and validation is mentioned.

S-034

Steger, Wilbur A. and T.R. Lakshmanan
PLAN EVALUATION METHODOLOGIES: SOME ASPECTS OF DECISION REQUIREMENTS AND ANALYTICAL RESPONSE. A paper prepared for Highway Research Board Conference on Urban Development Models held at Dartmouth College, New Hampshire. Consad Research Corp., June 1967.

A methodological review and critique, in which the past, present, and probable future status of the "evaluation and choice" phase of the overall planning process is analyzed by placing it in the context of the overall process and suggesting methods for achieving what evaluators of public choices would like to accomplish.

S-035

Stein, K.J.
TRAFFIC CONTROL OF ADVANCED SST STUDIED. Aviation Week, vol. 86, May 22, 1967, pp. 79-82.

The most needed avionic developments for safe, economical supersonic aircraft are emerging from studies at NASA's Electronic Research Center, which is oriented toward the SST. These include major advances in avionic subsystems, subsystem integration, and air traffic control systems, communications, guidance and navigation, flight instrumentation, and data management.

S-036

Stephenson, Henson K., J.S. Noel, and A.D. Mayfield
TRUCK WEIGHT TRENDS RELATED TO HIGHWAY STRUCTURES.
Texas Transportation Institute, College Station,
Texas, 1962.

S-037

Stevens, Hoy
LINE-HAUL TRUCKING COSTS IN RELATION TO VEHICLE GROSS WEIGHTS.
Highway Research Board Bulletin 301. National Research Council.
National Academy of Sciences, Washington, D.C., 1961. 136 pp.

The methodology for adjusting cost factors for differences in prices paid for fuel, wages, fringe benefits, depreciation and interest charges, and new vehicles is shown. The data are reported in an extensive series of charts showing the variations in vehicle-mile costs by loaded gross weight for all the 23,384 trailer combinations, all the gasoline engine powered trailer combinations, all the diesel engine powered combinations, and by groups of types of trailer combinations using either gasoline or diesel engines. Other charts and tables show how unit costs are affected by body type, type of terrain, average daily travel mileage, average load speed, and other operating variables.

S-038

Stevens, Hoy
LINE-HAUL TRUCKING COSTS UPGRADED, 1964. In: Line-Haul Trucking Costs and Weighing Vehicles in Motion. Highway Research Record, no. 127. Highway Research Board. National Academy of Sciences, Washington, D. C. 1966, pp. 1-21.

Highway Research Board Bulletin 301, published in 1961, is updated to 1964. The report presents the line-haul operating costs for highway freight vehicles operating on rural highways where consistant road speeds are attained for terminal-to-terminal operations. Data is presented to facilitate the investigation of the overall economic advantages which might result from permitting higher axle and gross weights for motor freight trailer combinations and to evaluate these facilities with greater load-carrying capacities. Vehicle operating costs are presented in terms of vehicle-miles and payload ton-miles, and in relation to gross weight trailer combinations. Methods and sources for updating the 1961 data are presented. Summation-of-costs charts are given showing both gross operating costs in relation to loaded gross weights of trailer combinations and a breakdown of the various cost factors. Tables present cost reductions possible by increasing vehicle gross weights.

S-039

Stowers, J.R. and E.L. Kanwit
THE USE OF BEHAVIORAL SURVEYS IN FORECASTING TRANSPORTATION REQUIREMENTS. In: Economic Forecasting. Highway Research Record, no. 106. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966, pp. 44-51.

Gives findings and implications of a nationwide behavioral survey by the University of Michigan Survey Research Center, of urban households in which recent residential moves, travel habits, socio-economic characteristics, and preferences regarding the choice of residential location and mode of travel were analyzed for their bearing on urban transportation.

S-040

Stratford, Alan H.
THE PROSPECTS OF LOWER AIRLINE AND AIRPORT COSTS.
J. Royal Aeronautical Society, vol. 69, no. 659, November 1965, pp. 749-755, Discussion, pp. 755-758.

A paper read at a symposium on Cheap Short Range Air Transport. Among the specific areas discussed are: airline costs and revenue, indirect operating costs, international collaboration, cost saving made possible by technical pooling and agreements, the effect of airline size, the shuttle (a summary of the economics of the shuttle service operated by Eastern Airlines between Boston, New York and Washington), airport costs, cargo loading at airport terminals, and other sources of cost saving.

S-041

Stroup, Robert H., L. A. Vargha and R. K. Main.
PREDICTING THE ECONOMIC IMPACT OF ALTERNATE INTERSTATE ROUTE LOCATIONS. In: Indirect Effects of Highway Improvement: 1962. Highway Research Bulletin 327. National Research Council. National Academy of Sciences, Washington, D.C., 1962. pp.67-72.

The central problem in the investigation was to predict the quantitative effects of each alternate location on highway-oriented business currently along a major route parallel to a proposed one. The method involved the use of the concept of an economically neutral road as a standard by which the alternative locations could be judged. The effects were measured in terms of the business volume projected to 1975 with the aid of data from a specially designed origin-destination study, a motel survey, a restaurant survey, national park statistics, and gross receipts and income data. Each alternate route was compared with the neutral road on various bases: access, visibility of establishments, advertising restrictions, and anticipated driver behavior.

S-042

Stufflebeam, George T.
THE TRAFFIC DICTIONARY. Simmons-Boardman, New York, 1950 (rev.)

A handbook of domestic and foreign trade and transportation terms, phrases, and abbreviations.

S-043

Sutton, R.M.
FUTURE TRANDS, SHIPPER TO TERMINAL. SAE - 2nd International Forum for Air Cargo. Proceedings May 26-28, 1964, p. F1-22.

Future Trends, Shipper to Terminal, R.M.SUTTON. SAE—Int Forum for Air Cargo, 2nd—Proc May 26-28 1964 p F1-22. Study of distribution problems starts with examination of volumes shipped by destination, shipment size, order characteristics, physical distribution costs, and service requirements; some methods which shippers and carriers developed are indicated; economics of air cargo ground handling and control; approach to cost problem based on assumptions for 1968 to 1975 period; effects of aircraft type, of shipment size and weight, indirect operating expense and benefits of containerization are discussed; determination of terminal costs.

S-044

Systems Analysis and Research Corp.
PUBLIC BENEFITS PROVIDED BY THE LOCAL AIRLINE INDUSTRY; A REPORT ON THE NATION'S FAST-GROWING LOCAL AIRLINE INDUSTRY. Report no. 4. Prepared for Association of Local Transport Airlines. Cambridge-Washington, 1965.

The public benefits provided by the local transport airlines continued to increase after 1963, although federal funds remained the same in 1963 and 1964. Part I of this study reports the services and other benefits provided by the local air carrier industry for the communities, passengers, commerce, postal service, and national defense. Part II provides summaries for 13 local airlines in mainland U.S., of the areas and scopes of routes system and operations. Service provided, passengers carried, and other characteristics are shown for each. In addition, numerous graphs, route system maps and summary tables provide the reader with an over-all knowledge of each carrier's operations, including present and future aircraft fleet.

S-045

Systems Analysis and Research Corporation.
PUBLIC BENEFITS PROVIDED BY THE LOCAL AIRLINE INDUSTRY.
Report no. 5. Prepared for the Association of Local Transport Airlines, Washington, D.C., April 1967.

Part I of this study describes the service and other benefits provided by the local carriers in the continental U.S. for the communities, the passengers, the postal service and the national defense. The public benefits of local airline service are increasing as indicated by the increased number of route miles and cities served, and the increased number of plane miles and seat miles. The local airlines have continued to improve service in the smaller cities and have reduced public service payments. Part II describes the operations of the U.S. local carriers in Alaska, Hawaii and the Caribbean. Part III summarizes for each of the 13 local continental carriers the area and scope of its route system and operations.

T-001

Tedrow, Joseph H.
TEDROW'S REGULATION OF TRANSPORTATION; PRACTICE AND PROCEDURE BEFORE THE INTERSTATE COMMERCE COMMISSION, by Marvin L. Fair and John Guandolo. 6th ed. William C. Brown Co., Dubuque, Iowa, 1964 (rev.).

T-002

Thiel, Floyd I.
HIGHWAY INTERCHANGE AREA DEVELOPMENT. In: Indirect Effects of Highway Location and Improvements. Highway Research Record, no. 96. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965. pp. 24-45.

A review of research conducted or sponsored by various state highway and planning agencies. The following conclusions are drawn: Local initiative and state action on the interchange problem are needed. There are numerous problems of land-use near the interchanges of controlled-access highways but it is agreed that the economic opportunities created by interchange construction should be utilized. The complexity of this problem is demonstrated by the fact that some interchanges with little economic development are congested, whereas others handle traffic satisfactorily, the largest problem being varying amounts of traffic some distance away which rely on the interchange for access. There is no agreement on whether state or local governments should be responsible for guiding development in interchange areas or on the general type of land-use control. As for legal techniques, only the power of eminent domain and the police power have received much use along highways, and the use of both together appears to be best. The appendix reports a number of interchange and land-use control studies in a number of states, including Pennsylvania.

T-003

Thiel, Floyd I.
SOCIAL EFFECTS OF MODERN HIGHWAY TRANSPORTATION. In: Indirect Effects of Highway Improvement: 1962. Highway Research Board Bulletin 327. National Academy of Sciences, Washington, D.C., 1962. pp. 1-20.

A review with 82 references. The social effects of highways on users and non-users, the effects of mobile and drive-in services, of public services, and of opportunities for employment on recreation, on residential patterns, and similar topics are considered. For example, in the discussion of the effects of highways on residences such topics as the effect of depressed highways, of elevated highways, and the interrelationships between highways and urban blight, are discussed.

T-004

Thompson, A.W.
EVOLUTION AND FUTURE OF AIRPORT PASSENGER TERMINALS. ASCE Proceedings, vol. 90, (J. Aero-Space Transport Division), no. AT2, Oct. 1964, paper 4064, pp. 127-134.

Evolution and Future of Airport Passenger Terminals, A.W. THOMPSON. ASCE—Proc v 90 (J Aero-Space Transport Div) n AT2 Oct 1964 paper 4064 p 127-34. Increase in air transportation has led to substantial change in function and design of airport terminals; need to limit passenger-walking distances has led to development of satellite concept in combination with mobile lounges and moving sidewalks; as result of airport passenger terminal design developments in United States growth of commercial air transportation is reviewed.

T-005

Thompson, H.L.
FREIGHT RATE EQUATIONS. Industrial and Engineering Chemistry, vol. 52, November 1960, Suppl. 44A-48A.

Equations that express unit freight rates as a function of length of haul are derived. Their applications to industry and the implications of these equations for the analysis of distribution of freight by mode of transportation are discussed briefly.

T-006

Thompson, James A. and B. I. Fansler.
ECONOMIC STUDY OF VARIOUS MOUNTING HEIGHTS FOR HIGHWAY LIGHTING. In: Night Visibility. Highway Research Record, no. 179, Highway Research Board, National Research Council, National Academy of Sciences, Washington, D.C., 1967, pp. 1-15.

The cost-effectiveness of various luminaire mounting heights and methods of evaluating alternate lighting designs were studied. Lighting designs with mounting heights of 40-50 ft. were found to be more economical and effective than the usual 30 ft. mounting height. (9 charts and 13 references)

T-007

Tivark, R.
A PREDICTIVE MODEL OF ECONOMIC GROWTH AT NON-URBAN INTERCHANGE SITES ON PENNSYLVANIA INTERSTATE HIGHWAYS. Pennsylvania State University. (in preparation - April 1967)

T-008

Tollefson, Harold M.
TRANSIT TAX KEEPS BUSES ROLLING IN WASHINGTON STATE. Nation's Cities, vol. 5, no. 6, June 1967. pp. 9-10.

Tacoma and Yakima, Washington, have adopted a new method of supporting their financially-troubled transit systems. Approved by the people at the polls, this new method is a transit tax or transit stand-by charge. Every housing unit and business concern pays a specified monthly amount as a means of subsidizing the bus system whether they use it or not. In 1966 Yakima a lease-management agreement with a transit system was approved with a 65-cent monthly transit tax, with Tacoma following suit with a 75-cent monthly tax. Although the crisis is temporarily over, the subsidy requirement continues to grow, and an over-all solution is desired.

T-009

Tondel, L.M.
NOISE LITIGATION AT PUBLIC AIRPORTS. Journal of Air Law & Commerce, vol. 32, no. 3, Summer 1966, pp. 387-407.

T-010

Torrey, Richard F.
TRANSPORTATION FACTORS IN PLANT LOCATION. Rubber Age, vol. 97, no. 3, June, 1965, pp. 86-87.

A blueprint for the conduct of a preliminary transportation availability study is presented. It is stated that such studies are necessary for the purpose of properly evaluating the adequacy of proposed plant sites.

T-011

Traffic Service Corporation
A GLOSSARY OF TRAFFIC TERMS AND ABBREVIATIONS. Prepared by E. Albert Ovens. Traffic Service Corporation, New York, 1967.

T-012

Transportation Association of America.
DOT: DEPARTMENT OF TRANSPORTATION; A SUMMARY OF ITS ORGANIZATION, EXECUTIVE POSITIONS, RESPONSIBILITIES. Washington, D.C. April 1967.

A list of the agencies and functions transferred to DOT, job descriptions of the executive positions together with an organizational chart with pictures of the holders of the positions. Biographical information of key personnel is also included. The chart is based upon the substance of the legislation and is not official.

T-013

Transportation Association of America.
REPORT. Transportation Association of America, 1101 17th Street, N.W., Washington, D.C., 20036.

A monthly comment on matters of interest to the field of transportation, together with material of organizational interest and descriptive matter on the activities of the Association.

T-014

Transportation Association of America
TRANSPORTATION: FACTS & TRENDS. Fourth ed.
Washington, D.C. , April 1967.

Information is limited to general data on such topics as: importance of transportation in the economy, transportation outlays vs. the gross national product, the estimated national freight bill, the estimated passenger bill, economic trends vs. the gross national product, the estimated national freight bill, the estimated passenger bill, economic trends vs. transportation trends 1939-1966, transportation vs. general price trends, intercity freight by modes, intercity travel by modes, federal and state taxes derived from transportation. The regulatory agencies are described and sources of the statistical data given. Quarterly supplements are published to maintain currency.

T-015

Transportation Association of America.
TRANSPORTATION RESEARCH. Fifth edition. Transportation Association of America, Washington, D.C., 1966.

A survey based on a questionnaire distributed in academic, industrial, and governmental circles, of current and proposed transportation research projects of a "policy-type" nature, with major emphasis on economic or other social scientific studies. Replies received show 197 projects under way, 232 recently completed studies, and 65 areas for investigation. The material is indexed under 13 major subject headings.

T-016

Transportation Association of America.
WHAT'S HAPPENING IN TRANSPORTATION. Transportation Association of America, 1101 17th Street, N.W., Washington, D.C., 20036.

A one-page digest of currently reported news issued biweekly. The material is presented under the headings of: air, general, highway, pipeline, rail, and water.

T-017

Transportation Consultants, Inc.
AIDS AVAILABLE FOR COMPATIBLE LAND USE PLANNING AROUND AIRPORTS. Prepared for the Federal Aviation Agency. Transportation Consultants, Inc., Washington, D.C., June 1966. AD 650-271.

The aids referred to are in the fields of administration and planning for airports, property acquisition and development, property regulation and conversion. Appendices include government aids available for compatible land-use planning and names and addresses of administering agencies. Also presented are models of legal and related forms to facilitate action in the various fields.

T-018

Transportation Consultants, Inc.
COMPATIBLE LAND USE PLANNING ON AND AROUND AIRPORTS. Transportation Consultants, Inc., Washington, D.C., June 1966. AD 650-267.

A guide to airport planners and executives in complying with FAR Part 151.26, FAR Part 77, and the obligations under Grant Agreements to insure compatible uses of land in the vicinity of airports.

T-019

Transportation Research Forum
RATES AND TARIFFS-AUTOMATION'S IMPACT; REGIONAL CONFERENCE, COLUMBUS, OHIO, MAY 20 AND 21, 1964. R.B. Cross Co., Oxford, Ind., 1964.

T-020

Turner, L.R. and L. Philpot
HIGHWAY SAFETY 1960-1965; AN ANNOTATED BIBLIOGRAPHY. Virginia Highway Research Council, Charlottesville, Virginia, 1966.

U-001

U.S. Army Corps of Engineers.
WATER RESOURCES DEVELOPMENT IN PENNSYLVANIA. U.S. Army Corps of Engineers, North Atlantic Division, New York, N.Y., Jan. 1967.

Information on the scope and progress of Pennsylvania water resources development by the U.S. Army Corps of Engineers including projects authorized but not started, projects underway, and those completed; work under special continuing authorities (flood control projects, etc.) regional investigations underway, for example, the Northeastern U.S. Water Supply Study; basic development investigations, and surveys underway. Maps include Pennsylvania water resources development.

U-002

U.S. Bureau of the Census.
CENSUS OF TRANSPORTATION 1963. Bureau of the Census, Washington, D.C.

U-003

U.S. Bureau of the Census.
STATISTICAL ABSTRACT OF THE UNITED STATES: 1966. (87th edition.) Bureau of the Census. U.S. Department of Commerce, Washington, D.C., 1966.

A massive annual report including more than 50 pages and nearly 100 tables on transportation. Also included are references to state data sources and to other sources of statistical information.

U-004

U.S. Bureau of Public Roads
FEDERAL LAWS, REGULATIONS AND OTHER MATERIAL RELATING TO HIGHWAYS. Bureau of Public Roads, U.S. Department of Commerce, Washington, D.C., 1966.

U-005

U.S. Bureau of Public Roads
HIGHWAY STATISTICS 1965. U.S. Bureau of Public Roads. U.S. Dept. of Transportation, Washington, D.C., 1967.

Statistics on a number of subjects, including fuel consumption, rates and revenues, vehicle registrations, licenses, taxes, tolls, mileage of public roads and streets, and mileage and financing of Federal aid highways.

U-006

U.S. Bureau of Public Roads
MANUAL FOR APPLYING CRITICAL PATH METHOD TO HIGHWAY DEPARTMENT ENGINEERING AND ADMINISTRATION. U.S. Bureau of Public Roads, Washington, D.C., Nov. 1963.

Manual for Applying Critical Path Method to Highway Department Engineering and Administration. U S Bur Pub Roads, Washington, DC, Nov 1963 200 p. Origin and development of Critical Path Method and application of CPM in aiding planning and control responsibilities of management are discussed; growth and acceptance of this management technique in highway industry; appraisal of CPM usage in various functional areas by state highway departments; computerized CPM.

U-007

U.S. Bureau of Public Roads
MAXIMUM DESIRABLE DIMENSIONS AND WEIGHTS OF VEHICLES OPERATED ON THE FEDERAL-AID SYSTEMS. U.S. Government Printing Office, Washington, D.C., 1964.

U-008

U.S. Bureau of Public Roads
TRAFFIC ASSIGNMENT AND DISTRIBUTION FOR SMALL URBAN AREAS. U.S. Govt. Printing Office, Washington, D.C., 1965.

U-009

U.S. Chamber of Commerce
AMERICA'S CITIES: CURRENT PROBLEMS AND TRENDS. U.S. Chamber of Commerce, Washington, D.C., 1966.

U-010

U.S. Civil Aeronautics Board
C.A.B. HANDBOOK OF AIRLINE STATISTICS. U.S. Government Printing Office, Washington, D.C., 1966.

U-011

U.S. Civil Aeronautics Board.
DOMESTIC ORIGIN-DESTINATION SURVEY OF AIRLINE PASSENGER TRAFFIC. TEN-PERCENT SAMPLE FROM JANUARY 1 THROUGH DECEMBER 31, 1962. 1962 YEAR. The Airline Finance and Accounting Conference. A Division of the Transport Association of America, Washington, D.C. [1963?]

The Civil Aeronautics Board annually compiles data on a variety of subjects of interest to the members of the Air Transport Association which, in turn, publishes them. The above compilation, cited for illustrative purposes, contains details on origins and destinations of passengers by pairs of cities. Issued in sets (at $750 / set) that contain basic and summary data on such topics as "Competition among Domestic Air Carriers", "International Origin-Destination Survey of Airline Passenger Traffic" and the study cited above, these publications are a source of statistical information in this area.

U-012

U.S. Civil Aeronautics Board.
HANDBOOK OF AIRLINE STATISTICS, 1965 EDITION. Washington, D.C., U.S. Government Printing Office, 1966.

A reference source containing a statistical description of the individual United States airlines in 1964, including comparative capacity, traffic, revenues and net income by traffic type, and data for system operations with similar data for domestic and international operations; historical statistics by carrier group, through 1964 by calendar year; traffic statistics of the certificated route air carriers by individual carrier and carrier group for the calendar years 1954-1964; similar data on income; miscellaneous air-transport data; chronologies of air-transport events; comparisons with other modes of transportation; a glossary, and a general index and an index of airlines.

U-013

U.S. Congress, Joint Committee on Printing.
CONGRESSIONAL DIRECTORY, Ninetieth Congress, first session. U.S. Government Printing Office, Washington, 1967.

This publication, "for the use of the United States Congress," and brought up-to-date soon after each Congress takes office, contains biographies of the Senators and Representatives by state, committee assignments, lists of administrative assistants and secretaries, statistical information, the organization of the Congress (speaker and his staff, clerk and his staff, etc.), and information about the executive branch and the agencies of the government. For the most part the information given consists of the titles and the names of incumbents. There is a subject listing at the beginning (called a table of contents) and an individual listing index. Agencies dealing with transportation are listed: e.g., the Federal Communications Commission, the Department of Transportation, the Department of Housing and Urban Development (including the Assistant Secretary for Metropolitan Development), the Federal Aviation Agency, and the Interstate Commerce Commission. The telephone number is given for the agency. The residence address is given for individuals.

U-014

U.S. Congress, Senate, Select Committee on National Water Resources. SUPPLEMENTAL INFORMATION ON SUBJECTS COVERED BY THE COMMITTEE'S STUDIES PURSUANT TO S. RES. 48. Eighty-sixth Congress, U.S. Government Printing Office, Washington, D.C., January 1961.

This is a critical study of Committee Print No. 11, namely the report of the Corps of Engineers, U.S. Army, to the U.S. Senate Select Committee on National Water Resources entitled "Future Needs for Navigation." The criticism covers the report's statement of economic benefits to be derived from the proposed expansions in the nation's waterways; its failure to consider the alterations in capacity possible in a competitive society, errors of forecasting and several other areas which the critique considers mistaken or inaccurate, including justification, cost estimates, benefits expected and statistics used. Inherent waterways limitations are stated to be circuity, speed, seasonality, geographical coverage, and commodity usage. Other limitations are that use of them is incidental to waterside location, that a few large shippers are the principal beneficiaries of waterway improvements, and that water transport costs are understated because waterway improvement costs are not included in the total cost. A major premise of the report, that the railroads could not absorb the annual increase in water traffic is analyzed and considered to be false, and other carriers are described as having excess capacity. The importance to national defense of the waterways system is denigrated through examples of bombing raids on waterways and canals showing them to be highly vulnerable to attack. Waterways are shown by statistical tables to be less economical than railroads and future growth is shown capable of being handled more efficiently and more cheaply by rail. Finally the report is criticized as being not germane to the subject under consideration by the committee. Various communications by interested groups on the subject of water consumption concerning other Committee prints are included, mainly in the form of correspondence.

U-015

U. S. Department of Commerce
THE EFFECTS OF RESTRICTIVE MUNICIPAL REGULATIONS ON MOTOR CARRIER OPERATIONS AND COSTS. (Project Transim). Prepared by Department of Engineering, University of California. U.S. Department of Commerce, Washington, D.C., 1966.

U-016

U.S. Department of Commerce.
FEDERAL TRANSPORTATION POLICY AND PROGRAM. U.S. Government Printing Office, Washington, D.C., 1960.

This report, presented by President Eisenhower, identified certain transportation problems and suggested a redefined role of the Federal government as well as administrative and legislative steps to assure a balanced development of our transportation system. The long-range objective of Federal policy should be a reduction in the cost of transport. Less improvement has been made in distribution than in production and the remaining potential for improvement in the nation's economic efficiency lies in the area of distribution of which transportation is the largest single element. A broad plan for the achievement of these objectives should include: adequate capacity, low cost, low rates, customer choice, carrier initiative and health, Federal neutrality user charges, subsidies (reduced and then eliminated), and Federal economic regulation (equitable for all carriers, a factual basis for uniformity of policy). Our present situation is a loose grouping of individual industries: vast networks of highways, railways, inland waterways, airways and airports, pipelines. Little attention has been paid to conflict among these. Economic regulation has been administered in rigid compartments although problems are common to many types. Total capacity is not geared to total need. The best way to achieve these objectives is by fostering an economically balanced transportation system in which each mode of transport carries what it can haul most economically and the entire system keeps adapting to technology and the national economy. Two approaches are possible: Federal regulation with centralized thinking in Washington, or fair competition in price and service to the customers with regulation only where monopoly or the threat of destructive competition remains. The carriers would have greater freedom in setting rates and developing their routes and services. Certain action programs are outlined and the effects on carriers suggested.

U-017

U.S. Department of Commerce. Maritime Administration.
THE ECONOMIC IMPACT OF UNITED STATES OCEAN PORTS. U.S. Department of Commerce, Maritime Administration. U.S. Government Printing Office, Washington, D.C., 1966.

Employment generated by exports, cargo earnings, tonnages and values of cargo, numbers of passengers, numbers of vessels, port development expenditures, are presented in tabular form by state, ports, and congressional districts. The various kinds of information were obtained from various sources, and hence do not all refer to the same time period. (Employment data are for 1960; port traffic figures are for 1962 and port development expenditures for 1946-1962).

U-018

U.S. Dept. of Commerce. Maritime Administration. Office of Program Planning.
UNITED STATES SEAPORTS-ATLANTIC COAST. U.S. Maritime Administration-Port Ser., pt. 1, Aug. 1963, 170 p.

United States Seaports—Atlantic Coast. U S Maritime Administration—Port Ser pt 1 Aug 1963 170 p. Second of series of 3 publications containing data of value to commerce and shipping interests; port administration, federal functions and services, port and terminal rates, services, and charges; labor contracts, rules, benefits, wage rates and related data; foreign and domestic trade; port development and port-related technical studies and research program, and policy and legal actions taken by Federal Government affecting port industry.

U-019

U.S. Federal Aviation Administration.
FAA INFORMATION. Office of Information Services, Federal Aviation Administration, Department of Transportation, Washington, D.C.

This is the heading employed for news releases to newspapers and other communication media. The specific issue (67-64, for release August 26, 1967) is an announcement of the fiscal year 1968 federal-aid airport program. The 72 pages contain a summary by state with the number of projects and the federal funds granted. Also included is a breakdown by states and towns giving the amount granted for each project and a description of the work to be done.

U-020

U.S. Federal Aviation Administration.
GENERAL AVIATION STUDY AND FORECAST OF FLEET AND ITS USE IN 1975. Economics Division. Office of Policy Development. Federal Aviation Adminstration, Washington, D.C., 1966.

U-021

U.S. Federal Aviation Administration.
NATIONAL AIRPORT PLAN: FISCAL YEARS 1968-1972. Federal Aviation Administration. Department of Transportation, U.S. Government Printing Office, Washington, D.C., 1967.

A five year plan identifying existing and new airports recommended for development. The National Airport Plan, listing airports, heliports, and seaplane bases which make up the national system of airports, and identifying the communities where new facilities are required, is analyzed. Statistical tables give estimated recommended airport development cost by cost item by state. The principal Federal agencies involved in coordinating airport planning are described, as are National Airport System planning and development criteria. The economic prospects of the aviation industry and air transport to 1975 are presented in graphs. The airport environment is presented from a historical, socio-economic point of view, and current problems of aircraft noise, and airport access are discussed. Most of this book is devoted to descriptive airport data, arranged in tabular form by state. Airports, heliports and seaplane facilities are listed alphabetically within each state. They are analyzed as to site status, kind of airport, congestion reliever, recommended runway length, and recommended development. FAA field office addresses complete this valuable work.

U-022

U.S. Federal Aviation Agency.
ACCESS TO AIRPORTS; SELECTED REFERENCES, 1963-1966. Bibliographic list no. 12. Compiled by L.K. Annus, Federal Aviation Agency, Washington, D.C., 1966.

U-023

U.S. Federal Aviation Agency.
AIRCRAFT NOISE AND SONIC BOOM; SELECTED REFERENCES. Bibliographic list no. 13. Federal Aviation Agency, Washington, D.C., Oct. 1966.

A bibliography of 460 annotated entries with author and corporate source index.

U-024

U.S. Federal Aviation Agency. Flight Information Division
AIRMAN'S INFORMATION MANUAL. U.S. Government Printing Office, Washington, D.C., Dec. 1964.

U-025

U.S. Federal Aviation Agency.
ECONOMIC PLANNING FOR GENERAL AVIATION AIRPORTS. Federal Aviation Agency Planning Series, Item no. 4. Federal Aviation Agency, Washington, D.C., Dec. 1960.

Basic guides useful in designating places for airport location for a balanced airport system are presented. Statistics are given on ownership and location of general aviation aircraft; brief studies are presented on airport planning for air carrier communities and in communities without air carrier service. The conclusions state in part that places with 10,000 population or 10 based aircraft constitute general aviation's best markets for airports; in metropolitan areas, a neighborhood with 10 aircraft owners justifies an airport if no suitable one exists within 10 miles or 30 minutes driving time; and large air transportation centers need separate general aviation airports.

U-026

U.S. Federal Aviation Agency.
FILMS FOR PUBLIC USE. U.S. Federal Aviation Agency, Washington, D.C., January, 1967.

The FAA distributes films, many of which are technical. In their Bulletin "Films for Public Use" of January, 1967 two appeared to be of interest.

It Pays to Stay Open (FA-609) -- This film documents how low-cost lighting of airports, particularly utility-type airports, provides round-the-clock operations and can result in economic benefits to a community. Describes how business leaders of two Massachusetts communities, working with their State Aeronautics Commission and the Federal Aviation Agency, equipped their airports with low-cost runway and approach lighting. 23 minutes. 1966. Color.

The Best Investment we Ever Made (FA-304) -- Describes the economic benefits of general aviation airports. Can be used most successfully in describing these benefits to local officials in communities without airports. Color. 23 minutes. 1964.

U-027

U.S. Federal Aviation Agency.
HELIPORT DESIGN GUIDE. Federal Aviation Agency, Nov. 1964, Washington, D.C. AC 150/5390-1.

A comprehensive guide for the development and construction of all types of heliports and for assistance in understanding the need for heliports. A standard source of heliport design criteria, it outlines basic physical, technical, and public interest factors. An overview of the subject as well as the role of government, helicopter characteristics, classes of heliports/helistops, site selection, physical characteristics, elevated heliports, visual aids, safety considerations, and a selective bibliography are included. Appendices include FAA forms, helicopter data charts, and illustrations and diagrams of helicopters and heliports.

U-028

U.S. Federal Aviation Agency.
PLANNING THE AIRPORT INDUSTRIAL PARK. Advisory Circular, no. AC 150/5070-3. Federal Aviation Agency, Washington, D.C., Sept. 30, 1965.

The planning, organizational control and operation of the airport industrial park is discussed, including layouts of selected operating airport industrial parks. Topics include: the organization for development, physical planning, land use controls, management and operations, federal and state assistance.

U-029

U.S. Federal Aviation Agency.
PLANNING THE METROPOLITAN AIRPORT SYSTEM. Advisory Circular no. AC 150/5070-2. Federal Aviation Agency, Washington, D.C., Sept. 1965.

The relationship between airport system planning and comprehensive metropolitan planning is discussed. Metropolitan airport system planning should be part of the comprehensive metropolitan planning program and checklists of elements to be included in such programs are provided.

U-030

U.S. General Services Administration.
UNITED STATES GOVERNMENT ORGANIZATION MANUAL 1967-68. REVISED JUNE 1, 1967. Office of the Federal Register. National Archives and Records Service. General Services Administration. Government Printing Office, 1967.

The three branches of the government are described in detail and the incumbents and their titles listed. The scope of each agency is indicated together with its history, functions and limitations. There is an index by agency title and subject. The Department of Transportation, with names and titles of officials as of June 1, 1967 is included, together with information on the structure and function of the Civil Aeronautics Board, the Interstate Commerce Commission, the Federal Power Commission, as well as similar agencies. There is also a separate index of names so the person in charge of a specific area can be identified. Telephone numbers are only given for the agency under the name of the unit.

U-031

U.S. Interstate Commerce Commission. Bureau of Accounts
COST OF TRANSPORTING FREIGHT BY CLASS I AND CLASS II MOTOR COMMON CARRIERS OF GENERAL COMMODITIES BY REGIONS OR TERRITORIES FOR THE YEAR 1965. U.S. Interstate Commerce Commission, Washington, D.C., 1966. (ICC Statement No. 7-66)

U-032

U.S. Interstate Commerce Commission. Bureau of Accounts.
TRANSPORT STATISTICS IN THE UNITED STATES FOR THE YEAR ENDED DECEMBER 31, 1965. PART 6. OIL PIPE LINES. Bureau of Accounts Interstate Commerce Commission, Washington, D.C., 1966.

This volume is the 47th in a series of similar reports and contains a summary of selected financial and operating data from 1961-1965: Pipeline mileage by individual company, by states; various financial data including income items, operating revenues and expenses, capitalization and dividend declarations; number of employees and their occupations; and corporate changes for 1965.

U-033

U.S. Interstate Commerce Commission. Bureau of Economics
AIR-TRUCK COORDINATION AND COMPETITION. Statement 67-1.
Bureau of Economics. U.S. Interstate Commerce Commission,
U.S. Government Printing Office, Washington, D.C., Feb. 1967.

Coordination of different services and modes of transportation is frequently a desirable objective of regulatory policy, as well as national economic policy. One type of coordination likely to be of increasing significance in the future is that between air cargo carriers and motor carriers of freight. This study evaluates the general characteristics of air-truck coordination and problems involved in its development. Despite certain seeming anomalies, public policy not only calls for greater coordination between air and truck lines but also a reasonable degree of competition between these modes. For this reason, the study examines certain aspects of air-truck competition and their significance. Consideration is also given to certain legal, regulatory, operating, technological, and economic factors which may or could deter the development of air-truck coordination. Although qualified by the limited data available, the study assesses prospective developments in both air-truck coordination and competition.

U-034

U.S. Interstate Commerce Commission. Bureau of Economics.
TRANSPORT ECONOMICS: MONTHLY COMMENTS. Bureau of Economics.
Interstate Commerce Commission. June 1967. Washington, D.C.

A monthly statistical report on significant aspects of transportation. Current information on general subjects such as: rail carload way bill statistics; operating revenues by modes of regulated transportation, revenues and expenses, class I line-haul railroads.

U-035

U.S. Waterways Experiment Station, Vicksburg, Miss.
NAVIGATION CONDITIONS AT LOCKS AND DAM NO. 4, MONONGAHELA
RIVER PENNSYLVANIA. Technical report. Vicksburg,
Mississippi. 1966.

On the Monongahela river there are presently 12 locks and dams which are old and in need of replacement and inadequate for modern tows. Congress authorized improvements including replacing old locks and dams and the construction of others, for the existing and expected traffic on the river. Tests were undertaken to determine whether flows and eddies produced by the improvements would be a danger to traffic; it includes recommendations for construction to correct for potential hindrances.

V-001

Vaughan, Harry.
UNITED STATES TRANSPORT POLICY WON'T BE DECIDED AS SINGLE PACKAGE-BOYD. Nation's Cities, vol. 3, no. 10, Oct. 1965, pp. 24-25.

Alan S. Boyd, who formulated President Johnson's transportation program stated that the ills that beset America's various transportation systems will be attacked one by one. Highway safety is a high-priority item, citing the Baldwin amendment that Congress nearly approved which would have denied federal funds to states not having adequate safety programs. As to rates and mergers, Boyd suggested that the various agencies go their own and often diverse ways. The major problem, he stated, is that we are rapidly becoming a nation of cities and future transportation programs must be geared to meeting these needs and that all modes of transit should be meshed into the best system for each metropolitan area.

V-002

Vernon, R.
METROPOLIS 1985; AN INTERPRETATION OF THE FINDINGS OF THE NEW YORK METROPOLITAN REGION STUDY. Harvard University Press, Cambridge, Mass., 1960.

An interpretation of the principal findings of a series of books dealing with the forces that shape the New York Metropolitan Region. The economic history of the region is discussed, emphasizing the region's advantages and disadvantages for different kinds of business and industry, and the interrelation between the jobs in the region and the people who live in it. Local government problems, the commuting crisis, and rapid transit services are analyzed along with a projection of the metropolis of 1985.

V-003

Virginia Council of Highway Investigation and Research.
FORECASTING AND ESTIMATING; A SELECTED ANNOTATED BIBLIOGRAPHY WITH SPECIAL EMPHASIS ON METHODOLOGY, by Marvin Tummins and William R. Trenor. Charlottesville, 1961.

Virginia Council of Highway Investigation and Research.
Forecasting and estimating; a selected annotated bibliography with special emphasis on methodology (supplemented by a section of unannotated entries, by Marvin Tummins, consultant, and William R. Trenor, highway economist. In cooperation with the U. S. Bureau of Public Roads. Charlottesville, 1961.
ix, 93 p. 29 cm.
Z7164.T8V5 016.3850973 61-62777

V-004

Voorhees, A.M.
AIRPORT ACCESS, CIRCULATION, AND PARKING. ASCE Proceedings, vol. 92. (J. of Aero-Space Transport Division), no. AT1, Jan. 1966, paper 4611, pp. 63-75.

Airport traffic is divided into its various components such as air travelers, workers, and visitors to determine from them certain implications for proper airport parking, access, and circulation facilities; it is emphasized that for proper access and circulation, airports should be located on freeway system; direct access should be provided to air terminal, air-freight terminal, and parking areas; truck and auto movements should be separated, and internal transportation should be provided as necessary, and separated from other forms of airport traffic.

W-001

Walker, W.J. and J.K. Howell.
TRANSIT EXPRESSWAY MEDIUM-DENSITY MASS TRANSIT SYSTEM.
ASME Paper 65-RR-5, for meeting Apr. 7-8, 1965. 8 pp.

Transit Expressway Medium-Density Mass Transit System, W.J. WALKER, J.K.HOWELL. ASME—Paper 65-RR-5 for meeting Apr 7-8 1965 8 p. Test installation of new transit system concept called "Transit Expressway" nearing completion in South Park, Allegheny County near Pittsburgh, Pa; system concept, design philosophy, project objectives, and features of vehicle, structural, communication and control, and power-distribution design are explained; system features rubber-tired vehicles with electric propulsion and automotive-type running gear; trains, whose consist (number of cars) may be varied to meet changing demand, are assembled by mechanical transfer devices and are operated under precise headway, speed, and acceleration control from wayside.

W-002

Wallace, S.R.
AIR CARGO HANDLING - ASSOCIATED GROUND SUPPORT EQUIPMENT.
SAE-Paper 650207 for meeting Apr. 12-15, 1965, 6 p.

Air Cargo Handling—Associated Ground Support Equipment, S. R.WALLACE. SAE—Paper 650207 for meeting Apr 12-15 1965 6 p. Ground support equipment for DC-8F jet freighter was developed by United Air Lines, using analysis of air freight processing on ground, and study of functional requirements for handling of pallets; systems approach for total dock-to-air-to-dock was employed to assure speed and efficiency in handling jet aircraft on ground; paper presents statistical findings of air freight characteristics and development of ground equipment using "off-the-shelf" component parts, assembled to load and unload 10,000-lb pallets in less than 1.5 min each; example of O'Hare air freight terminal, Chicago.

W-003

Wallace, S.R.
JET CARGO FACILITY REQUIREMENTS. ASCE Proceedings, vol. 90, (J. Aero-Space Transport Division), no. AT2, Oct. 1964, paper 4068, pp. 135-140.

Jet Cargo Facility Requirements, S.R.WALLACE. ASCE—Proc v 90 (J Aero-Space Transport Div) n AT2 Oct 1964 paper 4068 p 135-40. It is stressed that expanding air-freight industry requires that plant facilities be kept ahead of operating demand; it is estimated that air-freight volume in 1970 may be 6 times as much as that carried in 1963; adequate planning to allow for orderly expansion is required.

W-004

Warskow, M.A. and A.E. Tiemann
CAPACITY OF AIRPORT SYSTEMS IN METROPOLITAN AREAS. ASCE Proceedings, vol. 92, (J. of Aero-Space Transport Division), no. AT1, Jan. 1966, paper 4609, pp. 35-61.

Airports in and around metropolitan areas must be planned and operated as a system. A methodology is presented for evaluating quantitatively the operational factors involved in the development of the airport system. Among the factors considered are: (1) airspace use, including interactions between airports; (2) airport capacity; (3) runway, taxiway, and apron facilities; and (4) helicopter operations. The methodology provides a technique for computing the current and future annual capacity of each airport and of the total airport system, taking account of the limitations caused by any of the operational factors. The computation evaluates the number and time of operating delays over a one year period and selects annual capacities at a reasonable delay level. Such computations permit a comparison of annual capacity with forecasts of demand to determine the need for improved airport facilities or new airports. Examples of use of the methodology are given as well as an abbreviated technique for screening out alternative airport development plans in terms of capacity. (14 figures)

W-005

Watkins, H.D.
CAB MOOD SPURS ROUTE FILINGS FROM THREE ALL-CARGO CARRIERS. Aviation Week, vol. 86, no. 18, May 1, 1967, pp. 27-28.

Flying Tiger would like to add 12 cities to the 14 now served. Airlift, which operates from Northeastern cities to Europe, and Seaboard World would like to obtain the certificate of Slick Airways which is no longer operating. Flying Tiger would like CAB to hold a route proceeding at which the whole problem of domestic all-cargo system would be considered. Eastern and Northwestern have filed formal statements with CAB contending that Flying Tiger has not shown a need for the additional service it seeks, or the broad investigation it proposes.

W-006

Watkins, H.D.
SST PROGRAM RESPONSIBILITY SHIFTS. Aviation Week, vol. 86, no. 19, May 8, 1967, pp. 28-29.

The commitment of the Federal government to the construction and flight-testing of two prototype supersonic transports shows a shift in responsibility from government to industry. The Phase 3 contracts, signed May, 1967, charge the two prime contractors (Boeing for the airframe, General Electric for the engines) with the development by July, 1968 with financing plans for Phase 4 certification and Phase 5 initial production stages, with the least possible governmental participation in the additional $2-$2.5 billion needed after Phase 3. The Federal Aviation Administration will primarily monitor the program, doing financial planning, and helping with design problems. A table gives the agency's estimates of the Phase 3 financing.

W-007

Watkins, Harold D.
HUGHES DESIGNING CIVIL, MILITARY HOT CYCLE AIRCRAFT. Aviation Week, vol. 84, Feb. 28, 1966, pp. 48-9, 53, 55.

A description of design research at Hughes Tool Co. to produce a combination helicopter-airplane is presented. The propulsion system and vehicle design are described and performance predictions are given. A mass transit version capable of carrying 50 to 100 passengers at a direct operating cost of $230/hr. is outlined.

W-008

Wattleworth, J.A. and W.R. McCasland.
STUDY TECHNIQUES FOR PLANNING FREEWAY SURVEILLANCE AND CONTROL. In: Freeway Characteristics, Operations and Accidents. Highway Research Record, no. 99. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 200-223.

Four study techniques, found to be useful in planning the peak period freeway surveillance and control activities on the Gulf Freeway in Houston, are presented: entrance ramp origin-destination studies, input-output studies of closed freeway subsystems, aerial photography, and input-output studies of critical intersections in the study area. Data from these studies can be used to plan peak period ramp controls because demand and capacity can be estimated at each bottleneck; and to plan arterial street controls to provide for diverted traffic.

W-009

Weinberg, Morton I., J. Deleys and R.F. Schneeberger.
SURVEILLANCE METHODS AND WAYS AND MEANS OF COMMUNICATING WITH DRIVERS. National Cooperative Highway Research Program Report 28. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C.,1966.

A method to predict travel time on an urgan freeway during a traffic tie-up and on the effectiveness of an airborne observer to reroute traffic during a traffic tie up was investigated. The development of a mathematical logic to predict travel time following a breakdown in traffic flow is described. Calculation of the conditions that predict a tie-up and the resulting travel times are performed in real time on a high-speed digital computer. Data on traffic behavior are transmitted to the computer from volume-occupancy sensors spaced over the lanes of the freeway in a manner consistent with the data-sampling method and the expected mean speed of the cars. The computer is programmed to estimate the time required for the vehicles located at certain sensor stations to pass through the bottleneck. The object is to devise an early warning system to warn motorists to avoid the freeway. Another study evaluated the effectiveness of an airborne observer who communicates by commercial radio to motorists when incidents threaten to tie up traffic. Two crude analyses performed early in the project seemed to show that the cost (about $35,000 per year) could be justified. A cooperative study with nearly 5,800 motorists over a six-month period showed that there was economic justification for alerts. The annual saving in delay time was estimated at $48,000 for the vehicles alone. A tethered balloon with a closed-circuit television camera is also described (40 ft. diameter, 400 ft. altitude, $15,000 cost).

W-010

Westinghouse Air Brake Company.
DEMAND, SUPPLY, AND ECONOMIC IMPACT OF TRANSPORT IN THE KEYSTONE CORRIDOR. REPORT TO THE COMMONWEALTH OF PENNSYLVANIA. Pittsburgh, Pa. 1967. 87 pp. (Also: Appendix I, DEMAND ANALYSIS, 85 pp.; Appendix II, ROUTE ANALYSIS, 44 pp.; and Appendix III, SYSTEMS ANALYSIS, 99 pp.; Dec., 1966).

A study of a high-speed, east-west transportation system for Pennsylvania with the following suggested specifications; implemented by 1975, 81 feet wide roadbed with a two-track rail system carrying passengers and freight at 90 and 150 mph. Investment: $947 million for fixed facilities, $231 million for rolling stock. Estimate for 1990: four-track system and duplicate tunnels and bridges; additional cost: $504 million for fixed facilities and $103 million for rolling stock. Route: in the Pennsylvania Turnpike corridor from the Ohio line near New Castle through Pittsburgh, Harrisburg to Philadelphia. Cost of this system from the Ohio border to Parkesburg: $1.5 billion. It is predicted that the system will carry 36 million tons of freight and 3 million passengers annually earning $170 million over all costs including interest charges and amortization. The median strip is to earn revenues as a route for power lines and telephone lines. Hovercraft and integrated aircraft as possibilities for the future are mentioned. The recommendation of the study is that the Commonwealth should initiate a flexible program to provide high-speed surface transportation linking the Northeast Corridor with the industrial centers of the Midwest. Demand-, route-, and systems analyses, all of which are route oriented, are presented.

W-011

Wetmore, Joseph W.
V/STOL TRANSPORTS AND THEIR TERMINAL REQUIREMENTS. ASCE Proceedings, vol. 92, (J. of the Aero-Space Transport Division), no. AT1, Jan. 1966, paper 4612, pp. 77-93.

Major research and development efforts have resolved many V/STOL problems and are expected to yield still more improvements in efficiency, reliability and handling characteristics to make feasible its use in civil transport. Economic considerations suggest that the primary use of V/STOL aircraft will be in the short-haul market, where their advantages may offset the higher operating costs. To exploit these advantages special terminal facilities will be required. The size, arrangement location and support facilities of these terminals are considered as they are affected by the operational characteristics of the V/STOL such as landing performance, noise generation, downwash characteristics and requirements and limitations imposed by all-weather operations.

W-012

Wheatcroft, S.F.
TEN ECONOMIC LESSONS FROM SHORT-HAUL AIRLINE OPERATIONS. J. Royal Aeronautical Society, vol. 65, April 1961, pp. 221-31; DISCUSSION. pp. 231-5.

The author, an economic consultant to Britain's air industry, offers the following lessons: high route density is the key to lower costs and profitable operations; the highest practicable level of operating utilization is economically vital; high route traffic density makes possible high load factors without representing inadequate public service; flexibility in the disposal of payload has an important bearing on the ability of an airline to achieve high load factors; maximum flexibility is essential in airline pricing policy; cross subsidization of unprofitable operations by profitable services is a dangerous policy - commercially and socially; competition is a double-edged sword; specialization on particular kinds of operations brings great economic advantages in the airline industry; various forms of cooperation are becoming increasingly desirable and necessary; short haul airline managements must always watch costs carefully.

W-013

Whitby, R.H.
AN AIRLINE VIEW. J. Royal Aeronautical Society, vol. 69, no. 659, November 1965, pp. 732-737.

A paper read at a symposium on Cheap Short-Range Air Transport. Cheap and short range are stated to be a contradiction in terms: U.S. domestic operations in 1964 show that for the average trip of 680 miles there was a 10% margin of revenue over cost but at 200 miles there was a deficit of 30%. British European Airways (with which the author is affiliated) has had almost twenty years experience dealing with short-range operations and therefore has data for study. Total BEA operating costs; airframe prices in 1964; cost indexes; the real effect on operating costs of improvements in aircraft; reduction in operating cost by higher utilization and seating density; reliability and cost, size; turboprop and turbojet, are topics discussed. The author concludes that operating costs have halved in real terms during the last decade; direct cost changes have been equally split between increased aircraft efficiency including the effect of size, and putting more seats in a given space together with increased utilization; there are cost operational advantages of large size; there are physical limits to the extent to which more passengers can be got into aircraft; reliability is the most hopeful design feature to improve utilization and to cut maintenance costs; a wide market has to be found for any new aircraft otherwise high standing charges will prohibit low costs.

W-014

Whittelsey, C.C.
PIPELINES OF THE FUTURE. Oil and Gas Journal, vol. 60, February 19, 1962. pp. 123-4.

Pipelines will carry solids as well as fluids, will act as mixing vats processing materials while they are in transit, and will transport two, three or more materials at the same time. The pipeline will be built of new materials such as aluminum, now used on smaller lines and permitting automatic welding, or plastics, now used in gas-distribution systems and crude-oil gathering lines. Steel and iron will be the major pipe materials, but longer joints will reduce welding costs and exterior and interior coatings will increase lifespan. Also suggested as possibilities are undersea pipelines and rapidly depreciable mechanical equipment.

W-015

Williams, A.C.
A STOCHASTIC TRANSPORTATION PROBLEM. Operations Research, vol. 11, September 1963. pp. 759-70.

Solutions are presented to the transportation problem represented by a single homogeneous commodity from several sources distributed to a number of destinations, where the demand for the commodity at each of the several destinations is a random variable. The analysis is presented in terms of a shipment by a business firm but there are implications for general traffic flow.

W-016

Wohl, Martin
COSTS OF URBAN TRANSPORT SYSTEMS OF VARYING CAPACITY AND SERVICE. In: Top Issues in Urban Research 1963. Highway Research Record, no. 64. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963, pp. 1-70.

The framework and methodology for costing alternative urban transport systems is defined, and variables most intimately affecting the relative cost structures (e.g. station spacing, transport type, volume levels, schedule frequency, etc.) are identified. The conditions under which lowest costs may be attained are specified by comparing the costs of alternative modes of transport at equivalent passenger volumes and service levels for each. The analysis included hourly passenger volumes ranging from 5,000 to 50,000 and primarily focused on the downtown to-and-from home, rush-hour movement. Rush-hour travel by various types of facilities and volumes during peak hours is considered for variable route lengths. For situations in which a connecting downtown distribution system is not to be provided, express bus operations were found to be preferable in terms of both cost and service, at hourly passenger volumes in excess of 5,000. However, for volumes at or just below 5,000, the private automobile appeared to be preferable. Rail transit systems exhibited substantial cost economies compared to other modes when underground transport is needed.

W-017

Wolfe, Roy I.
CONTRIBUTIONS FROM GEOGRAPHY TO URBAN TRANSPORTATION RESEARCH. In: Urban Transportation: Demand and Coordination. Highway Research Board Bulletin 326. National Research Council. National Academy of Sciences, Washington, D.C., 1962. pp. 46-66.

A brief review with 53 references of the geographic concepts applicable to urban transportation. While these concepts are not, perhaps, unique to geography, the insights that arise from them may be. Among them are: location theory, central place hierarchy, urban functional classification, regional land-use analysis, simulation models, graph theory, and particularly new approaches to cartography, including the use of machines in mapping mathematical maps, and distortions that will clarify the relations between distance, cost, and time.

W-018

Wood, Jr., H.E.
NEW APPROACH-TOLL TRAFFIC ASSIGNMENTS. Traffic Eng., vol. 35, no. 6, Mar. 1965, pp. 18-19, 48, 52.

New Approach—Toll Traffic Assignments, H.E.WOOD, Jr. Traffic Eng v 35 n 6 Mar 1965 p18-19, 48, 52. Concept underlying development of toll traffic assignment procedure uses toll adjusted time ratios, allows use of standard time ratio formula and enables mechanization required for extensive traffic assignment projects; development of toll time ratio formula and example of toll assignment curve locus derivation are described.

W-019

Work, J.W.
AN ECONOMIC REPLACEMENT MODEL FOR HIGHWAY SURFACE DETERMINATION. In: Highway Economics, Highway Research Record, no. 12. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963. pp. 124-148.

Points out basic inadequacies in the conventional cost approach to highway surface-type determination and presents an economic replacement model, which recognizes the value of funds over time. The former approach relies on a static concept of cost and requires a predetermined estimate of surface life; the latter can make an objective determination of surface life and recognizes all costs associated with the surface structure over its life. The conventional approach does not distinguish between value and cost and does not take into account the element of road user cost. The proposed model computes the present worth of present and future highway construction, maintenance, and road user costs, and stresses economic optimization rather than the conventional considerations. Its application to actual data is shown.

W-020

Wortman, R.H.
MULTIVARIATE ANALYSIS OF VEHICULAR SPEEDS ON FOUR-LANE RURAL HIGHWAYS. In: Traffic Flow Characteristics 1963 and 1964. Highway Research Record, no. 72. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 1-18.

Multivariate Analysis of Vehicular Speeds on Four-Lane Rural Highways, R.H.WORTMAN. Nat Research Council—Highway Research Board—Research Rec n 72 1965 p 1-18. For evaluation of variables, mathematical models were devised for purpose of predicting mean spot-speeds; these models produced equations which were developed by use of multiple correlation and linear regression analysis, and factor analysis; speeds on four-lane rural highways throughout Illinois were studied to obtain data for evaluation of mathematical models; 38 variables were measured at 83 study sites to represent conditions at each location; seven additional sites were sampled to test validity of speed prediction equations developed; observed mean speeds were compared to estimated velocities obtained by equations.

W-021

Wright, J.M. and S.C. Tignor
RELATIONSHIP BETWEEN GROSS WEIGHTS AND HORSEPOWERS OF COMMERCIAL VEHICLES OPERATING ON PUBLIC HIGHWAYS. SAE-Paper 937B for meeting Oct. 19-23, 1964.

Relationship between Gross Weights and Horsepowers of Commercial Vehicles Operating on Public Highways, J.M.WRIGHT, S.C.TIGNOR. SAE—Paper 937B for meeting Oct 19-23 1964 8 p. Study was carried out to provide data on weight-power ratios of vehicles; information is necessary in developing analyses of travel time, grade-climbing ability, and accelerating ability of trucks; data analysis indicates that there is definite increase in weight-power ratios of commercial vehicles as number of axles increases and that there is trend toward lower weight-power ratios; this is substantiated by average reductions in ratio of 12% from 1949 to 1955 and 28% from 1955 to 1963; performance requirement of 400 lb/hp is liberal and would affect only small percentage of total vehicles.

W-022

Wright, P.H.
TRAFFIC, TRAFFIC GENERATORS IN CENTRAL BUSINESS DISTRICT. Traffic Eng., vol. 35, no. 6, Mar. 1965, pp. 23-4, 46.

Traffic, Traffic Generators in Central Business District, P.H. WRIGHT. Traffic Eng v 35 n 6 Mar 1965 p 23-4, 46. Research undertaken at Georgia Institute of Technology to study fundamental relationships between various types of floor space use within central business district and traffic which it attracts is described; research included studies of Gainesville, Charlotte, Chattanooga, Atlanta, and Pittsburgh; close correlation was found between traffic and retail, office, service, and public floor space use.

Y-001

Yau, S.S.
SENSITIVITY OF TRAFFIC NETWORK. Franklin Inst.-J., vol. 278, no. 6, Dec. 1964, pp. 371-82.

Sensitivity of Traffic Network, S.S.YAU. Franklin Inst—J v 278 n 6 Dec 1964 p 371-82. Sensitivity of traffic network is defined for studies of variation of terminal capacities due to decreases of capacities of individual stations and links; derivation of technique for designing such traffic networks by using minimum sum of branch capacities and vertex capacities. 16 refs.

Z-001

Zboralski, D.
[COMBATING TRAFFIC NOISE.] DER VERKEHRSLAERM UND SEINE BEKAEMPFUNG. Glasers Annalen, vol. 88, no. 10, Oct. 1964, pp. 341-7.

Der Verkehrslaerm und seine Bekaempfung, D.ZBORALSKI. Glasers Annalen v 88 n 10 Oct 1964 p 341-7. Combating traffic noise; problems associated with reducing noise of transport confined to permanent way are discussed; necessity of uniform system of measurement and binding noise limit on international level is emphasized.

PA.
E. O

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A Selected and Annotated Survey of the Literature on

– TRANSPORTATION –

STATUS, STRUCTURE, CHARACTERISTICS, PROBLEMS, AND PROPOSED SOLUTIONS

Compiled by

Jacob Grauman, Walter Bethel, Carol Carr, Mary Doran and Steven Manch
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PREFACE

This annotated bibliography stems from a comprehensive survey of the literature on transportation, originally undertaken by the Science Information Services of The Franklin Institute Research Laboratories for the Governor's Committee for Transportation of the Commonwealth of Pennsylvania, in support of its activities and those of its subcontractors. The bibliographic task consisted of the examination of the extensive published information on the status, the needs, the problems, and solutions to problems faced by the several modes of transportation: railroads, highways, air transportation, pipelines, waterways, and urban transportation. It likewise covered the material on new technology as it related to transportation, economics, intermodal relationships, legal aspects, safety, system automation, mathematical modeling, computer simulation, and land use aspects as these related to transportation.

From this material, 614 items were selected for inclusion in the present bibliography. The results of this selection are presented in the form of abstracts, annotations, and citations. These are arranged alphabetically by author so that the accession numbers, which are a combination of letter and sequential number, represent the first letter in the author's name and his posting within that letter: the bibliography thus serves as its own author index. A detailed subject index is provided at the beginning of the volume.

It is hoped that this bibliography will serve a twofold purpose: to introduce the general reader to a large variety of topics and writers on these topics; and to provide both the general and the specialized reader with references to sources that contain extensive citations on various specialized subjects which a general-purpose volume cannot expect to cover in detail.

It is to be expected that, in a volume of this size, some errors may have been overlooked. The authors will be grateful if such errors are called to their attention.

Finally, the authors wish to express their gratitude to the large number of individuals who gave valuable aid and advice during the initial stages of this study; and to the editors of a number of journals who generously gave permission to reproduce or quote from copyrighted material.

Alec Peters, Manager
Science Information Services
Franklin Institute Research Laboratories

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WATERWAYS TERMINALS C-013, H-104, S-022

A-001

Ad Hoc Committee of Librarians.
SOURCES OF INFORMATION IN TRANSPORTATION. Compiled by Ruth Blaisdell et al. Northwestern University Press, Evanston, Illinois, 1964.

A-002

Agle, C.K.
FROM HERE TO THERE: AN ANALYSIS AND PROPOSAL FOR TRANSIT. Traffic Quarterly, vol. 19, April 1965, pp. 240-6.

A new type of vehicle is proposed to provide high speed transportation, substantially door to door, in a single system. The vehicle is a cross between self-propelled bus and subway car and is capable of independent operation or operation as part of a train. It will be capable of running on highways or rails with immediate transfer from one to another. The proposed system is described and advantages and disadvantages are discussed.

A-003

Air Transport Association of America.
1967 AIR TRANSPORT FACTS AND FIGURES. Air Transport Association of America, Washington, D.C., 1967.

A-004

Allen, T.M.
FACTOR ANALYSIS OF ACCIDENT RECORDS. In: Highway Safety 1963 and 1964. Highway Research Record, no. 79. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 17-25.

The factors of good roads, weather, night, traffic conflict, rural roads, youth inexperience, weekend driving, and vehicle defect were analyzed for their contribution to accidents. Separate factor analysis was conducted on a random sample of 1000 fatal accidents. Linkage analysis was also supplied to data, primarily to group individuals into various classes.

A-005

Almond, J.
TRAFFIC ASSIGNMENT TO ROAD NETWORK. Traffic Engineering & Control, vol. 6, no. 10, Feb. 1965, pp. 616-17, 622.

The progress made by the Road Research Laboratory, Great Britain, on methods of assigning traffic to network, in which journey time along each link of network increases as flow on link increases is described. Speed/flow and journey-time/flow relations were analyzed. It is stated that traffic assignments can be made by the method described, to networks in which journey time along each link is function of flow.

A-006

American Society of Mechanical Engineers.
1966 NATIONAL TRANSPORTATION SYMPOSIUM. American Society of Mechanical Engineers, New York, N.Y., 1966.

A series of 54 papers organized under the following headings: Policies, general, future, and legislative; Planning and systems; Resources, including education, training, manpower, research, and financing; Technology of advanced vehicles and future power systems, including the commucar, undersea transportation, aircushion vehicles, new railroad freight vehicle equipment, the BARTD vehicle, the light weight gas turbine, interface craft, the space fuel cell power system, the turbine motor train, high speed transport in non-evacuated tubes, etc.; and Operations, including traffic control, interface problems, and flow control.

A-007

American Trucking Associations, Inc.
AMERICAN TRUCKING TRENDS 1966. American Trucking Associations, Inc., Washington, D.C., 1967.

An annual report on the trucking industry which presents data on growth of truck use in the U.S. 1906-66; truck registration by state 1940-65; distribution of trucks by type of vehicle and use; freight transportation (including a comparison with various other freight transportation means); carrier size and location; motor freight tonnage; agricultural shipments; manpower; equipment; revenues; earnings; and costs.

A-008

American Trucking Associations, Inc.
GUIDE TO THE TRANSPORTATION OF EXPLOSIVES AND OTHER DANGEROUS ARTICLES, INCLUDING DRIVER'S GUIDE. American Trucking Associations, Inc. 1966. 44 pp.

This revised Manual provides a guide to the regulations covering the transportation of hazardous materials. Tables listing articles considered hazardous, the special requirements for their handling, the placarding necessary for both containers and the transporting vehicles are presented. A Driver's Guide, corrected up to the first of March 1967, is also provided. Together they cover the basic requirements for safe shipping of dangerous liquids and solids. Where the regulations are too long or too complicated to be condensed, the reader is directed to the appropriate sections of the Code.

A-009

American Trucking Associations, Inc.
SHIPPER'S CHOICE. Current Report no. 11. American Trucking Associations, Inc., Washington, D.C., 1966.

A-010

American Trucking Associations, Inc.
TRUCKING...MODERN BUSINESS BAROMETER. Current Report: Motor Transport Economics, no. 15. American Trucking Associations, Inc., Washington, D.C., March 1967.

In 1959, a new business barometer, the Weekly Truck Tonnage Report, published by ATA, was started. This weekly index is carried by the Wall Street Journal, the New York Times, Business Week, and others. This issue of Current Report discusses the several series of indexes of truck tonnage compiled by the ATA. Charts are presented including trends in intercity truck tonnage and rail carloadings as compared to the GNP for 1949-1965; a comparison of the quarterly, monthly, and weekly truck tonnage data on a per cent change basis from the fourth quarter of 1965 through the third quarter of 1966; a comparison of the seasonally adjusted monthly truck tonnage index and the Federal Reserve Board's index of industrial production.

A-011

American Trucking Associations, Inc.
URBAN TRUCKING. Current Report no. 12. American Trucking Associations, Inc., Washington, D.C., 1966.

A-012

American Trucking Associations, Inc.
WHAT'S WRONG - WHAT'S AHEAD - IN DOMESTIC CARRIER SERVICE. ATA Foundation, Inc. American Trucking Associations, Inc., Washington, D.C., 1966.

A summary report on present and future shipping requirements of two-hundred-and-fifty American corporations sponsored by the Clark Equipment Co.

A-013

American Trucking Associations, Inc.
WHO'S "IN" IN PIGGYBACK? Department of Research and Transport Economics. American Trucking Associations, Inc., Washington, D.C., 1967.

The growth rate of freight moved by piggyback is shown in relation to that of railroads and motor carriers. Five piggyback plans are listed and summarized in the table appended on the next page. The importance of piggyback to rails, motor carriers, freight forwarders, and water carriers is discussed. Piggyback operation by type of equipment (containers vs. trailers) is analyzed. Tables indicate the number of units by mode as reported to the ICC, the average short-line hauls per car, trailer, and ton by plan number, etc.

TABLE I
PIGGYBACK PLANS

Plan Number	Who Originates	Who Picks Up and Delivers	Who Supplies Equipment and Transfers To Rail Equipment
I	Motor Carrier	Motor Carrier	Motor Carrier, trailer; Rail, flatcar
II	Rail	Rail	Rail
II-1/2	Shipper or His Agent	Shipper and Receiver	Rail
III	Shipper or Freight Forwarder	Shipper or Freight Forwarder	Rail transfers and furnishes flatcar; Shipper or Freight Forwarder own or lease trailer
IV	Shipper or Freight Forwarder	Shipper or Freight Forwarder	Shipper or Freight Forwarder furnish trailer and flatcar
V	Motor Carrier or Rail	Motor Carrier or Rail	Motor Carrier or Rail

A-014

American Waterways Operators, Inc.
BIG LOAD AFLOAT; U.S. INLAND WATER TRANSPORTATION RESOURCES. American Waterways Operators, Inc., Washington, D.C., 1965.

Following a review of water transport from a descriptive and economic viewpoint, barge service is analyzed and the history of water transportation is presented. Specifications and uses of individual towboats and barges are given. The personnel involved, the channels, locks and dams, ports and terminals, joint transportation benefits, and federal agencies involved are discussed. Specifications are given for important inland waterways of the U.S., together with their industries and principal commodities. The Ohio, Monongahela, Allegheny, and Delaware Rivers carry such commodities as: coal, petroleum, sand, gravel, industrial chemicals, iron and steel products, ores, wood pulp, etc.

A-015

American Waterways Operators, Inc.
1965 INLAND WATER-BORNE COMMERCE STATISTICS. American Waterways Operators, Inc., Washington, D.C., 1967.

An annual compilation of statistics on commodities transported over the inland waterways of the U.S. The lengths and depths of individual commercially navigable inland waterways including the Atlantic Coast Waterway, are given. The number and type of vehicles on inland waterways for the transportation of freight in comparison with previous years are provided; also the net tons and ton-miles including coastal traffic, and the principal commodities transported in net tons for 1965. Freight movements from 1960-1964 are compared by modes of transportation. The Allegheny,

Delaware, Monongahela, Ohio, and other rivers are examined as to location, depth, total annual traffic, and principal commodities for 1965 in net tons. A map of commercially navigable waterways of the U.S. is included.

A-016

American Waterways Operators, Inc.
WATERSIDE SITE PLANT LOCATIONS AND EXPANSIONS 1966.
American Waterways Operators, Inc., Washington, D.C.,
March 1967.

Private industry constructed, expanded, or announced plans to construct, a total of 530 plant facilities along or adjacent to navigable waterways, in 1966. These are listed alphabetically by river. Pennsylvania's plant facilities include: an argon refinery for Union Carbide along the Allegheny River, a chemical plant for Gulf Oil Corp. at Philadelphia along the Delaware River, steel mills for the U.S. Steel Corp. and several other steel companies along the Monongahela River, etc.

A-017

Ames, ArDee.
THE ABC OF HIGHWAY AID OR HOW A LITTLE PROGRAM GREW BIG,
STRONG AND CONTROVERSIAL. Nation's Cities, vol. 3, no. 5,
May 1965, pp. 22-24.

Virtually 90% of the $46 billion Interstate Highway Program is complete, final completion being scheduled for 1972. The Commerce Department's Bureau of Public Roads presides over annual expenditures of nearly $4 billion for highway construction. In 1966 existing federal-aid programs included the Interstate System expenditures of $2.8 billion, the ABC system expenditures of $1 billion and $179 million for other programs (national forest, park, etc.). The apportionment of these funds is discussed. The Interstate Highway Program is matched on a 90-10 per cent basis, and the ABC program on a 50-50 matching basis. Provisions of the 1956 Highway Act are presented. Federal funds, while increasing, still fall short in relation to actual traffic use. In 1972 the cities will, according to the author, still be suffering from massive traffic congestion and financially starved public transportation.

A-018

Ames, ArDee.
A MARRIAGE OF LOVE OR CONVENIENCE? Nation's Cities, vol. 2,
no. 8, Sept. 1964, pp. 10-11, 22-23.

Despite the 1962 Highway Act which specifies joint state- and local-planning, antagonism still exists between the highway engineer and the city planner. One problem is that federal money goes to the state highway departments, not to the cities. To improve the organization of the planning process, it is suggested that the organization be representative of the agencies and bodies responsible for plan implementation, with a nonpartisan viewpoint employed to resolve conflicts. Lack of community consensus on controlling major land uses, and lack of communication between the technician and policy-maker are impediments to intelligent highway building. The author suggests developing a generally accepted rating scale that would convert both highway dollar costs and intangible community values to a point system so that alternative highway locations could be compared systematically.

A-019

Anon.
AID FOR TRANSIT: A NATIONAL PROGRAM.
Nation's Cities, vol. 2, no. 8, Sept. 1964,
pp. 10-11, 22.

A report of the contents of the Urban Mass Transportation Act of 1964 together with some of its legislative history and the efforts of the American Municipal Association to secure its passage. Matching grants will be made to governmental units that have comprehensive plans and an economically feasible proposal.

A-020

Anon.
AIR-CUSHION VEHICLES TRY SHUTTLING PASSENGERS BETWEEN BAY-AREA AIRPORTS. Machine Design, vol. 37, Sept. 2, 1965, p. 12.

The nation's first scheduled passenger service using air-cushion vehicles started operation in the summer of 1965. In its day-to-day role, it will speed airline travelers and other passengers across San Francisco Bay; round trips include metropolitan Oakland International Airport, and downtown San Francisco. In the long run it will determine the economic feasibility and passenger acceptance of air cushion vehicles for mass-transit.

A-021

Anon.
AIRPORT ACCESS HELD COMMUNITY PROBLEM. Aviation Week, vol. 84,
May 30, 1966, p. 45.

The Federal government is firmly maintaining the position that congestion problems on roadways to and around airports belong to the communities involved, and that government participation toward correction will be limited to offering aid funds for research and development of modernized transit systems.

A-022

Anon.
AIRPORTS AND THE NEW JETS. Nation's Cities,
vol. 4, no. 4, April 1966. pp. 24-26.

The development of smaller jets (such as the British BAC-111, the Boeing 727 and 737, and the Douglas DC-9) that can land on shorter runways and can operate economically on runs of 100-300 miles makes it possible for medium-sized cities to enter the jet age. They may not, however, because it will take $2 billion by 1970 to improve their existing airport facilities. The $2 billion would come from the states and communities ($1.3 billion) and $150 million annually in federal grants. But the latter may not be available: the current aid-to-airport program of $75 million per year is reduced to $50 million in fiscal 1967 (largely due to huge increases in military spending) and Congress wants the present program terminated in three years. The Air Transportation Association has stated that smaller city airports have not kept pace with larger city airports in schedule reliability chiefly because they do not generate enough business to be eligible for federal funds to allow them to install improved electronic and visual aids needed to promote all-weather flying and thus improve reliability.

A-023

Anon.
AIR TAXIS, COMMUTERS FACE NEW RULES. Aviation Week, vol. 86, no. 16, April 17, 1967, p. 43.

The proposed regulations modify the present ones in four areas: new flight requirements would specify that multi-engine aircraft should be able to sustain a failure of the most critical engine at any time after takeoff without hazardous results. Turboprops would be required to demonstrate static longitudinal stability; takeoff field length would become an operating limitation; minimum flight crew requirements would be based on pilot workload, location and accessibility of the controls and command decisions; airframe requirements would be changed; powerplant regulations would be changed; subsystems and equipment required will include oxygen systems for pressurized aircraft operating between 15,000 and 25,000 ft.

A-024

Anon.
ANNUAL BUSINESS AIRCRAFT OPERATING COSTS; DOUGLAS DC-3
Aviation Week, vol. 86, Jan. 2, 1967, pp. 82-83.

A table based on data gathered in response to questionnaire issued by the Technical Committee of the National Business Aircraft Association. Figures are given for the latest available 12-month period (mostly calendar 1964 or 1965). The operator and the number of aircraft operated are given together with the variable expenses, normal fixed expenses, and additional fixed expenses. In addition the total hours flown, nautical miles flown and cost per nautical mile are given. This is one report in a continuing series dealing with various types of business aircraft.

A-025

Anon.
ARRIVAL AND DEPARTURE, CHANGES IN TRANSPORTATION.
Mechanical Engineering, vol. 88, Sept. 1966, p. 76.

Major changes in transportation envisaged in the next 15 years include high-speed trains, short-haul aircraft, and hydrofoil boats, which are alternatives to the increasing automobile congestion. The High-Speed Ground Transportation Act, concentrating on the Northeast Corridor, includes a study of all existing and some undeveloped modes of transportation to provide improved transportation between large cities. In one proposal, trains would be propelled through underground tubes by evacuating the air in the tunnel in front of the train and admitting air behind it, with a cruising speed of more than 500 mph. Short-haul intercity passenger trains are disappearing in favor of buses. Monorails have not demonstrated any advantages over conventional systems. Transportation of cars on multilevel auto-carrier high-speed trains has been proposed. Increasing air traffic suggested the use of V/STOL aircraft, although its present weight is economically disadvantageous. Larger and faster jets are already underway. It is forecast that the passenger liner will virtually disappear with the development of 50 mph passenger hydrofoil ships.

A-026

Anon.
BUDD HIGH-SPEED TRAIN. Product Engineering, vol. 36, no. 15, July 19, 1965. p. 59.

Budd Company has engineered passenger trains capable of attaining speeds of 160 mph for distances up to 500 miles. Made up of as many as 10 self-contained and individually powered cars, customer railroads will have options of either electric motors or aircraft turbines. The turbine has the advantages of less vibration, quietness, and nontoxic exhaust. The cars will hold from 235 to 250 passengers and borrow many ideas from airplanes. If used on such heavily populated corridors as Boston to Washington, Philadelphia to Pittsburgh, railroads will have to make substantial improvements to their roadbeds, running into millions of dollars. These high-speed trains will require welded rails instead of those now in use and the roadbed will have to be very smooth.

A-027

Anon.
BUREAU OF PUBLIC ROADS ANNOUNCES TRAFFIC ENGINEERING PROGRAM FOR CITIES. Traffic Engineering, vol. 37, March 1967, p. 53.

A-028

Anon.
CLEVELAND SETS A U.S. FIRST AS RAPID TRANSIT LINKS CITY TO AIRPORT. Engineering News, vol. 177, no. 20, Nov. 17, 1966, p. 75.

Cleveland, Ohio will be the first city in the United States, and the fourth in the world, to provide direct rail transit service between the heart of the city and its major airport. After a 15 minute train ride to the station, riders transfer to a bus to reach the airport. The $14 million extension will consist of two track running above ground parallel to the New York Central Railroad.

A-029

Anon.
COMING TO GRIPS WITH NEW HIGHWAYS; FIRMER LAND USE CONTROLS, SOUND TRANSPORTATION PLANNING, WILL CHANNEL THEIR COMMUNITY IMPACT. Nation's Cities, vol. 2, no. 1, Jan. Feb. 1964. pp. 19-21.

The economic impact of the Interstate Highway System's 41,000 miles of limited access highways is not yet completely felt. Near Spartanburg, S.C., for example, I-26 and I-85 intersect and within the city limits construction permits are up 250% and 25 new industries have located in the adjacent county. Downtown shopping districts may not suffer from highway bypasses. Shopping centers may have been built too soon and too close together. The kind of highway has much to do with its impact: a limited access highway is more apt to result in intensive land use (high-rise apartments, regional shopping centers, industrial parks) than is a free-access road (which is apt to become a neon jungle). The problem is what land use follows the highway. Urban areas must create plans and this requires cooperation between state and local officials. The basic ingredients of transportation plans are listed.

A-030

Anon.
DEPARTMENT OVERHAUL SPARKS ROAD PROGRAM STEP-UP. Roads and Streets, vol. 106, March 1963. pp. 74-5.

The Indiana State Highway Commission was, until January 1, 1961, composed of three members appointed by the governor: two members of the in party and one of the out. Beginning in 1961 the commission was organized along bipartisan lines. There are now four part-time members (two from each party) and a full-time executive director. Among the advantages that have accrued are: road construction programs are being set five years in advance and may stay fixed regardless of the election returns; land acquisition can be initiated far enough in advance to ensure orderly progress; organization and management have been reorganized. Accounting procedures have been studied and a machine system installed.

A-031

Anon.
EASTERN SEES 50 PER CENT CARGO BOOST WITH 727QCs, NEW FACILITIES. Aviation Week, vol. 86, no. 9, Feb. 27, 1967. p. 37.

By investing nearly $100 million in 16 Boeing 727QC transports and ground facilities Eastern Airlines expects to boost its air-cargo volume by 50%. The first seven transports were delivered in February. The aircraft can be converted from passenger to cargo within 30 minutes with the aid of nearly $1 million of mechanical equipment.

A-032

Anon.
ECONOMIC GAINS FORECAST FOR SST. Aviation Week, vol. 86, May 22, 1967, pp. 26-27.

Balance of payments impact of the supersonic transport program is expected to bring $17-32 billion into the U.S. economy between 1975 and 1990. Sonic boom restraints pose one of the most serious problems. Breakeven level for the government's investment in the craft would be reached at the 300th aircraft with a rate of return of 10% if 1,200 are built. Passenger appeal would permit a fare differential of 10-24% above subsonic jets. FAA economists believe that the supersonic transport will operate with a higher load factor than subsonic jets. Operating costs are compared between the two. The SST is superior to all subsonic aircraft on a passenger cost basis. The introduction of the U.S. supersonic transport in 1974-75 will not require major changes in present airports.

A-033

Anon.
EQUIPMENT IN PROGRESS FOR HIGH-SPEED GROUND TRANSPORTATION PROGRAM. Westinghouse Engineering, vol. 26, September 1966, p. 145.

Self-propelled railway passenger cars capable of speeds of 160 miles an hour are being built by the Budd Company for the Pennsylvania Railroad. They are expected to operate between New York City and Washington, D.C. in Fall, 1967.

A-034

Anon.
FACTORS IN PLANNING HELIPORTS. Public Works, vol. 97, May 1966, p. 72+.

A-035

Anon.
FARE STRUCTURE STUDY READY; PRELIMINARY CAB FINDINGS DUE. Aviation Week, vol. 86, no. 15, April 10, 1967, pp. 37-38.

The fare-structure study was requested by the Civil Aeronautics Board and paid for by the airlines. In eight volumes, it consists of a sample covering more than 1,700 more important high, medium, and low density city-pair markets out of the thousands existing in the domestic U. S. Fares, mileages, and fares per mile are compiled for eight basic classes of fare. Using statistical techniques a formula was developed for computing an industry average fare for each fare class and market. Actual fare deviations from this were then calculated in terms of dollars, cents per mile and percentages. The implications of this study are commented upon.

A-036

Anon.
FORD'S EXPERIMENTAL GAS TURBINE SUPERHIGHWAY TRUCK. Engineer, vol. 218, no. 5675, Oct. 30, 1964, pp. 744-5.

Ford's prototype of a heavy, supercharged, regenerative, gas-turbine powered truck to use 560 hp and to carry 170,000 lb gross at 70 mph over superhighways is described. Weight saving over diesel engines adds 2000 lb to payload and full automatic torque shifting and hydraulic retarder provide five forward ranges. Air conditioning for cab and power takeoff are also described.

A-037

Anon.
GROUND TRANSPORT PICKS UP SPEED. Engineering News Record, vol. 175, no. 24, Dec. 9, 1965, pp. 29-30.

A report prepared by the Massachusetts Institute of Technology for the Department of Commerce under the Northeast Corridor Transportation Project outlined four possible high-speed systems: a guideway on grade would be the least expensive and would be similar to a modern highway, possibly enclosed, and with some provision for automatic control of vehicles, however, settlement, expansion, and contraction owing to moisture and temperature changes would make alignment difficult to maintain within the close tolerances necessary at the speeds (200-300 mph) contemplated; an elevated guideway, more expensive, supported on piers 100 to 500 feet apart, would suffer from the same settling and temperature effects as the guideway at grade; a bored tunnel, about 100 feet down, would be expensive although right-of-way would be no problem, but foundations would be a problem in metropolitan areas; a deep rock tunnel 500 feet down would be most expensive but would offer flexible routing and would not be vulnerable to temperature or earth movement(except earthquakes). A suitable vehicle would be a significant factor in selecting the kind of guideway. Various possibilities mentioned include units on rubber or steel wheels, or on an air cushion, propelled by gas turbine engines or linear induction motors or forced through a tube. The layout could be a straight line with few stops or a network with an express line and local loops with transfers possible between moving vehicles.

A-038

Anon.
HELP COMING FOR MAIN STREET. Nation's Cities, vol. 5, no. 5, May 1967, pp. 7-9.

TOPICS (Traffic Operation Program to Increase Capacity and Safety) is a federally financed program for the improvement of traffic flow on certain streets (in towns of over 5000) not eligible for construction or reconstruction. 50% of the cost of studies will be supplied to local or state agencies. Types of improvements eligible for such aid: channelization of intersections; providing additional traffic lanes on approaches to signalized intersections; construction of pedestrian grade separations or highway grade separations to relieve a bottleneck along a street of adequate width; installation of control systems to make traffic signals responsive to traffic or, for example, to establish part-time one-way operations; improving highway lighting, traffic control signals, or any device for better safety or movement; development of separate lanes for passenger transfer at surface transit terminals with appropriate platforms or shelters within the street right-of-way; development of truck loading or unloading facilities where necessary to facilitate traffic. All proposals should be possible within the present right-of-way. Canton, Ohio and Stamford, Conn. have received grants from TOPICS.

A-039

Anon.
HIGH POWER SWISS TWIN-CAR SETS. Railway Gazette, vol. 121, no. 3, Feb. 5, 1965, pp. 105-6.

Single phase, four-motor electric trains of 1800 hp which were supplied to the Berner Alpenbahn group of lines in Switzerland are described. The trains are composed of nonarticulated coaches with the two inner axles of each car driven, thus four traction motors are installed. A new detail is the installation of fittings and control to enable a twin set to be used at one end of a push-and-pull train, composed otherwise of trailers, and at the far end control trailer. Control also permits multiple-unit coupling.

A-040

Anon.
HIGHWAY OUTLOOK STORMY AS COSTS RISE. Engineering News Record, vol. 176, no. 17, April 28, 1966, p. 21.

The interstate highway program will probably cost $4.15 billion more than the 1965 estimate of $46.8 billion. Highway beautification will cost $1.6 billion on the interstate system alone between 1966 and the proposed completion date of February 28, 1973. No estimate has been made of the cost of beautification on primary and secondary roads. It is estimated that if 1966 trends continue, by the end of 1972 material costs will be 5.3% above 1956 levels, equipment costs will be up 31.4%, and average wage rates will be up 73%.

A-041

Anon.
HOVERCRAFT: A SPECIAL REPORT. Marine Engineering/Log, vol. 71, Sept. 1966, pp. 61-68.

About September 1967 a 160-ton, passenger-car ferry, air cushion vehicle, the SR-N4

hovercraft, with a capacity of 250 seated passengers and 32 autos and a speed up to 70 knots will pose the first major threat to conventional ship ferries across the English Channel. By 1985 there will be an estimated fleet of 16 N4s. Investment and operating statistics are presented. A directory of U.K. firms and organizations in the ACV industry is provided. The production of SR-N3s, N4s, N5s, N6s, and other models is described. The four countries, other than the U.K. and the U.S. known to be developing ACVs are Russia, France, Japan and Israel. There is a tendency for ACVs to yaw at low speeds and to capsize during high-speed turns in calm water. ACV terminals are discussed.

A-042

Anon.
INCREASES IN AIRLINE OPERATING REVENUES, 1966 OVER 1965.
Aviation Week, vol. 86, no. 19, May 8, 1967, p. 48.

A table listing the passenger revenues, total operating revenues, and net profit or loss for 1965 and 1966, together with increases or decreases between the two years. The airlines are grouped by service: domestic trunk lines, international lines, local service lines, Alaska and Hawaii, and helicopters. Total operating revenue is given for all cargo lines. Additional balance-sheet and profit or loss information is also available in this and other issues.

A-043

Anon.
IN EUROPE YOU CAN TAKE IT WITH YOU. Railway Age, vol. 162, no. 10, March 13, 1967, pp. 24-26.

Carrying private automobiles by rail has become big business for Europe's railroads. Motorists drive their cars onto a car carrier, retire to the passenger cars and arrive, fresh and unharried, at their destination in the morning, having avoided hundreds of miles of congested traffic. The equipment used is the same as that used to deliver new cars from factories. The car carrier service is tied into the cross-Channel ferry service. In Europe the car carrier service takes motorists through the Alps, avoiding the delays caused by weather. The service through the Gotthard Tunnel has been so successful that a second tunnel is contemplated.

A-044

Anon.
JET SKIMMER SERVICE; AIR-CUSHIONED VEHICLES PLY SAN FRANCISCO BAY AREA. Compressed Air Magazine, vol. 71, May 1966, pp. 12-13.

The Bell SK-5 Jet Skimmer is the first hovercraft to provide scheduled passenger service in the U.S. Two vehicles have been leased to Port of Oakland and will be operated by San Francisco-Oakland Airlines. The SK-5 is an American version of the English SR-N5 developed by Westland Aircraft Limited. The Hovercraft generates and rides on a cushion of air that sufficiently reduces surface friction so that a small amount of thrust can move it along at high speeds. The craft is described in technical terms.

A-045

Anon.
MCMORRAN HEADS NEW YORK DOT. Engineering News-Record, Sept. 7, 1967, p. 46.

J. Burch McMorran, Supt. of Public Works for New York since 1958, became head of that state's new Department of Transportation. The new department will administer the nation's largest state highway program.

A-046

Anon.
MODERN PASSENGER TRANSPORTATION DIRECTORY. Kenfield-Davis Publishing Co., Chicago, Ill., n.d.

A-047

Anon.
MULTI-LEVEL CAR PARKING ON ARCHES; EXPERIMENT WITH RAMP STRUCTURE IN BIRMINGHAM. The Surveyor and Municipal Engineer, vol. 123, no. 3751, April 25, 1964, p. 27, 62.

An English firm (John Lysaght's Bristol Works, Ltd.) has designed, fabricated, and erected the structural steel of a car park in a design employing arch ramps each containing a self-contained parking system. The first such (demountable) installation was opened in Birmingham, England.

A-048

Anon.
THE NEW GENERATION OF SHORT-HAUL JETS. Engineering, vol. 199, no. 5162, Mar. 26, 1965, p. 396-7.

For the purposes of the article, a short-haul jet is defined as applying to aircraft using pure jet propulsion; intended for economic passenger carrying over stages up to 500 to 600 mi; with loaded weight in excess of 35,000 lb. Information is also given on British Aircraft Corp. One-Eleven, Douglas DC-9, Dassault Mystere 30, Boeing 737, Fokker F-28 Fellowship, with notes on possible Anglo-French cooperation on large capacity, subsonic transport.

A-049

Anon.
NEW PIPELINE TO SUPPLY DELAWARE VALLEY WITH TONNAGE AMOUNTS OF NITROGEN AND OXYGEN. Chemical & Engineering News, vol. 39, Aug. 21, 1961, p. 23.

A description of a new pipeline to carry nitrogen, oxygen and possibly other chemical to various locations, chiefly in the New Jersey and Delaware sections of Delaware Valley.

A-050

Anon.
NEW YORK STATE SAFETY CAR MAKES ITS DEBUT. SAE Journal, vol. 75, no. 3, March 1967, pp. 36-47.

In June 1965, the New York State Legislature passed a bill authorizing the development of a prototype safety car. Since the law specified that the conduct of the study should be free from the limits imposed by traditional design, manufacture, styling, testing and sales practice, a new approach was needed. That approach was to use the systems engineering techniques developed by the aerospace industry. These articles present the engineering and economic features of the prototype car. It is felt that the design would reduce the fatalities approximately 50 percent at a cost comparable to the price range of the current low-priced full-sized cars. Copies of the "Feasibility Study of New York State Safety Car Program--Final Report" may be obtained from William S. Hults, Commissioner, Department of Motor Vehicles, State of New York, Albany, New York.

A-051

Anon.
NO FEDERAL SUBSIDY DESIRED FOR PORT OF PHILADELPHIA SAYS AREA CHAMBER LEADER. Traffic World, vol. 121, no. 11, March 13, 1965, p. 24.

Frederick A. Potts, president of the Chamber of Commerce of Greater Philadelphia has asked Senator Clark to refrain from seeking federal aid for the Port of Philadelphia since such aid also would have to become available to competing ports which are already ahead of Philadelphia. Distributed on a formula basis and spread thin, it would minimize the chances of helping the Port of Philadelphia materially.

A-052

Anon.
PENNSYLVANIA RAILROAD MERGER PLANS INCLUDE BUCKEYE PIPE LINE CO. Oil and Gas Journal, vol. 62, Feb. 17, 1964, pp. 82-3.

The Buckeye Pipeline, once a part of the Standard Oil system, is a 7,500 mile crude and products system stretching from Pennsylvania, New York, New Jersey westward into the midwest. A map shows the crude oil lines, product lines, and the product lines jointly owned. The Pennsylvania Railroad will issue 700,000 shares of a new preferred stock with a par value of $70 million to acquire the outstanding stock of Buckeye as part of its diversification program to improve its competitive position.

A-053

Anon.
PEOPLE PODS MAY SERVE AIRPORTS. Engineering News Record, vol. 176, May 5, 1966, p. 19.

Los Angeles has received over $490,000 in federal funds for a $735,000 study of a mass transit system that may use helicopters with detachable pods to move travelers between the city and its present and future airports. The grant, awarded by the Department of Housing and Urban Development, is the first under the Urban Mass Transportation Act of 1964 for study of a system idea involving aircraft. The act permits federal financing of up to two-thirds the cost of such studies.

A-054

Anon.
PIPELINERS BUILT 21,342 MILES IN 1965. Petroleum Management, vol. 38, February 1966, p. 80.

A-055

Anon.
PITTSBURGH UNVEILS HUGH RENEWAL PLAN AND AN OVAL AIRPORT TERMINAL. Engineering News, vol. 176, no. 19, May 12, 1966, p. 22.

The Pennsylvania Railroad's 148-acre, 40-block development plan for downtown Pittsburgh is described, together with the Trans-World Airlines plan for a new airport to be constructed by TWA.

A-056

Anon.
POLICY AND STANDARDS FOR ENTRANCES TO STATE HIGHWAYS. Public Works, vol. 97, Dec. 1966, pp. 68-70.

A-057

Anon.
THE POTENTIAL OF COORDINATION AMONG THE FEDERAL AGENCIES REGULATING TRANSPORTATION. ICC Practitioner's Journal, vol. 33, Sept. 1965, pp. 872-94.

A-058

Anon.
PUBLIC TRANSPORT AT TURN OF KEY. Engineering, vol. 198, no. 5145, Nov. 27, 1964, p. 684.

A research project undertaken in Geneva by the Battelle Memorial Institute, considers a compact, silent, low performance, electrically driven car that can turn almost in its own length and emits no toxic fumes, for easing city traffic congestion. The car might be owned by individuals, but is conceived more as a self-service taxi, possibly for municipal operation. A proposal for a personal key system and metering arrangement is explained. Work being done in Geneva and Frankfurt on a fuel cell to replace the battery is also noted.

A-059

Anon.
RAIL/BUS EVALUATION CONTINUES. Aviation Week, vol. 87, no. 9, August 28, 1967, p. 57.

Two New York agencies are continuing evaluation of a rail-bus vehicle intended to decrease travel time between Manhattan's East Side Airlines Terminal and Kennedy International Airport. The prototype is a standard General Motors airport-type bus equipped with retractable rail wheels, enabling it to operate on standard railroad tracks as well as on highways.

A-060

Anon.
RAPID TRANSIT BUILDS AN ALLIANCE. Engineering News Record, vol. 176, no. 6, February 10, 1966, pp. 51-52.

A report on the First International Conference on Urban Transportation held in Pittsburgh, Pennsylvania. The most important problems considered by the speakers were political and economic, and more intergovernmental cooperation was called for. The achievements of Pennsylvania in the areas of urban transit and highways were mentioned. Financing, including Federal aid to modes other than highways was considered, and balanced transportation planning was called for. Rail systems were the favored means of ground transportation. The conference was seen as dedicated to exploring new ground rules rather than evolving definitive solutions. Some of the immediate results, it was noted, were the establishment of the Transportation Research Institute at Carnegie and the drawing of attention to Pittsburgh's capabilities in the field of transportation-equipment manufacture. (See also P-024)

A-061

Anon.
RAPID TRANSIT SERVICE FOR METROPOLITAN AREAS. Engineer, vol. 215, January 11, 1963, pp. 116-18.

A description, in a British publication, of Westinghouse's automated system which proposes the use of a twenty-passenger vehicle, travelling at speeds up to 50 m.p.h. on a trespass-free, aerial closed-loop expressway. The electrically driven trains would operate in trains of from one to ten units depending upon traffic density. 5,000 to 14,000 riders per hour could be handled. Trains would be automatically dispatched and computer controlled so that the maximum waiting time would be two minutes during 24-hour service. Fare collection and change making will be automated. Financing as well as engineering characteristics are discussed.

A-062

Anon.
ROADBUILDERS TAME TENNESSEE MOUNTAINS. Engineering News, vol. 176, no. 20, May 19, 1966, pp. 50-51, 54-55.

A description of the difficulties encountered in building certain sections of I-75 (which will run from Tampa to Sault Ste. Marie) in Tennessee. Isolation has been a problem and all the contractors have had to build access roads. One contractor spent two months building a 4-mile access road to his 6-mile project. Much of the rock is rotten, there have been overruns in quantities, sections have to be quickly redesigned when it is impossible or impractical to hold a line or slope. Problems of the four contractors and their solutions are described in some detail.

A-063

Anon.
RUBBER-TIRED TRANSIT TRAINS PROPOSED: WESTINGHOUSE ELECTRIC CORP. Engineering News, vol. 169, Dec. 13, 1962, p. 22.

Westinghouse Electric Corporation has proposed an automated urban rapid transit system designed to use 20-passenger vehicles traveling on an elevated concrete roadway at speeds up to 50 mph. Electrically driven, rubber-tired, aluminum cars

would operate in trains of one to 10 units each, depending on traffic demand. Capacity of the system, with stops planned to be about 1 mile apart, would be from 5,000 to 14,000 passengers per hour (one direction). The trains would be automatically dispatched and computer controlled. The system is planned to provide around-the-clock service with a waiting time between trains of never more than two minutes.

A-064

Anon.
SOME EXPERIMENTS AND APPLICATIONS. Highway Research Board Special Report 79. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964, pp. 119-36.

This review of publications on theories and experiments for development of scientific understanding of road traffic includes: instrumentation, driver experiments, car following, platoon studies, continuous-stream models and application of traffic theory to flow and intersection control. 48 refs.

A-065

Anon.
SOME TRENDS IN RIVERBOAT PROPULSION. Marine Engineering/Log, vol. 61, no. 1, Jan. 1966, pp. 60-61.

The trends in riverboat propulsion are of an evolutionary nature based largely on experience. Some advances of this nature are: multiple propellers, multiple engines, multiple steering and flanking rudders, controllable and reverse pitch propellers, tunnels or Kort nozzles to direct the flow of water to the wheel. Most modern riverboats have unidirectional engines with reverse-reduction gears for faster and more dependable handling. Other means being investigated are contraguide rudders, center-board trunk rudders, propeller-rudder combinations and various changes in hull shape.

A-066

Anon.
STATE HIGHWAY CONTRACTS: THE UP-AND-DOWN PATTERN WORSENS. Roads and Streets, vol. 109, February 1966, pp. 50-1, 77.

A listing, by state, of state highway department construction contract awards and payments. The survey shows state awards up 5% overall in 1965 compared with a prediction of a 12% increase at the beginning of 1965. For Pennsylvania, the corresponding figures are: a revised 1965 increase of 24% compared with a beginning of 1965 estimate of 14%.

A-067

Anon.
STOL TRANSPORTS SEEN GROWING WITH AIRPORT ACCESS PROBLEMS. Aviation Week, vol. 86, Jan. 9, 1967, p. 33.

The potential U.S. market for 30 and 60-passenger short-takeoff-and-landing(STOL) transports, designed to ease the airport access problem, could reach $940 million in 1975 according to a New York management consultant and economist. As traffic volume

grows more frequent service could be offered. Municipalities would profit from STOL ports due to additional tax revenues from firms directly and indirectly associated with it. Development of STOL aircraft would increase airline traffic by accelerating the growth of the short-haul market.

A-068

Anon.
SUPREME COURT RULES AIRPORT LIABLE FOR NOISE DAMAGES. Aviation Daily, vol. 139, March 6, 1962, p. 31.

A-069

Anon.
TUNNEL TRANSPORTATION CONNECTING BOSTON AND WASHINGTON. Mechanical Engineering, vol. 89, April 1967, pp. 56-7.

A condensation of an article by William Lucke, consultant to the Department of Commerce Office of High Speed Ground Transportation. The underground tunnel approach to the problem of transportation in the "Northeast Corridor" is seen as attractive because of the high cost of real estate, the increasing need for all-weather transportation and the requirements of extremely high speeds and limited right of way. The obstacles are seen as limitations in tunneling technology and geophysical testing techniques. Multiple use of the facility for utilities and mail as well as transportation is seen as making the facility more economical.

A-070

Anon.
TURBINE TRAIN TEST SLIPS FIVE MONTHS. Aviation Week, vol. 87, no. 9, Aug. 28, 1967, p. 55.

Two gas-turbine trains developed by United Aircraft Corporation's Systems Center are running about five to six months behind schedule because of unexpected lubrication problems at low speeds. One train, consisting of three cars, with each end car powered, is to be used on Boston-New York segments, and will reach a top speed of 160 mph. Objectives of current testing are to insure adequate braking, minimal noise and sufficient air conditioning and heating.

A-071

Anon.
TWO AIRPORTS SHOW TWO CONCEPTS. Engineering News, vol. 178, no. 1, August 4, 1966, p. 16.

Two airport master plans are compared and contrasted. Kansas City's Mid-Continent will cost about $61 million with 60 gates at four terminal units. Cars and buses will enter the airport complex from U.S. 71 about 16 miles from the downtown area and feed into a one-way circular loop passing each of the four terminal units, each of which is a large circular concourse with 15 loading gates and adjunct passenger and cargo handling facilities. Cars are parked in the center of the circle. Philadelphia's International Airport is not new but an expansion of existing facilities. It is not laid out around cars but around passengers. An elevated road will serve a new four-story parking structure for the existing West Wing as well as a similar structure for the proposed East Wing. Parking capacity by 1980 is 12,000 cars. Costs and technical factors are enumerated.

A-072

Anon.
U.S. AGENCIES BOOST URBAN DESIGN WITH NEW PARTNERSHIP.
Nation's Cities, vol. 5, no. 6, June 1967, p. 18.

Three U.S. agencies (Department of Housing and Urban Development, Department of the Interior, and the Department of Transportation), cooperated in a study that recommended that the 1,750-foot section of the Delaware Expressway (Interstate Route 95) which parallels Independence National Historical Park be lowered and landscaped thus creating a park-like area for public use. A portion of Delaware Avenue next to the Expressway on the east should be depressed and covered. The cost of depressing and covering the Expressway ($9 million) would come from federal funds ($5.4 million), the state ($0.6 million) and from the state highway department ($3 million) (but recoverable from the Open Space Program of the Department of Housing and Urban Development and Water Conservation Fund money). The cost of the Delaware Avenue portion should come from the City of Philadelphia and the State.

A-073

Anon.
U.S. WATERWAYS NEED $8 BILLION. Engineering News-Record, vol. 165, Aug. 25, 1960, p. 28.

A brief description is presented of an Army Engineers Report on needed improvements and additions to U.S. navigable inland waterways for the 1960-1980 period. The report states that one half of the existing system requires improvement of channels, locks and terminals and recommends additional projects to carry the expected 100% increase in freight. Among these projects is a connection between the Ohio River and Lake Erie.

A-074

Anon.
WOOING THE COMMUTER. Nation's Cities.
vol. 3, no. 7, July 1965, pp. 19-20, 22.

The 75-mile Bay Area Rapid Transit system in the San Francisco area will cost $1 billion and will open in 1968 with the entire system in operation by 1971. Displays of the rolling stock feature streamlined cars with 80 mph speed, air conditioning, extra-wide seats, and handsome interiors. Frequent service is contemplated: at rush hours trains will leave every 90 seconds. Speed will be a factor: from downtown Oakland to San Francisco in eight minutes when it takes 30 minutes by car today. The roadbed is specially designed: welded wide-gauge rails mounted on rubber pads and cushioned with new materials. The system is coordinated into a master plan for the entire region.

A-075

Anon.
WORLD AIRLINE SURVEY. Flight, vol. 87, no. 2927,
April 15, 1965, pp. 562-608.

This annual guide to the world's airline industry contains information on over 700 operators, including: the types of service carried out, a listing of the aircraft fleet, and other particulars.

A-076

ASCE. Task Committee on Channel Stabilization Works.
Committee on Regulation & Stabilization of Rivers.
CHANNEL STABILIZATION OF ALLUVIAL RIVERS. ASCE Proceedings, vol. 91, (J. Waterways & Harbors Division) no. WW1, Feb. 1965, pt. 1, paper 4236, pp. 7-37.

A study of channel stabilization and bank protection works on 14 alluvial streams in the continental United States is reported. Data on current (1964) practices of channel stabilization and bank protection work were collected and analyzed. The conclusions are presented and explained in the report.

A-077

Ashley, Roger H. and F. Berard.
INTERCHANGE DEVELOPMENT ALONG 180 MILES OF I-94. In: Indirect Effects of Highway Location and Improvements. Highway Research Record, no. 96. Highway Research Board. National Research Council. National Academy Of Sciences, Washington, D.C., 1965, pp. 46-58.

All 66 interchanges in 180 miles of freeway in Michigan are analyzed and classified in relationship to the community with guidelines for predicting results. The four major categories were: full, partial, closed, and terminal interchanges. Variations in land uses - commercial, industrial, residential, vacant, or governmental, among the full, partial, and closed interchanges were compared. All major city interchanges developed high commercial values and at secondary city interchanges, some form of commercial development occurred. Partial or half interchanges showed little reaction and closed interchanges showed no reaction to the freeway. Business successes justified the investment in land and buildings at the interchanges.

A-078

Ashlock, James R.
EARLY SELECTION OF HELIPORT SITES URGED. Aviation Week, vol. 77, Nov. 26, 1962, p. 43.

Considerations in civic planning for heliports are reservation of sites, changes in zoning laws to facilitate heliports, and public education. Safety and noise level of helicopter operations are discussed. A recent survey showed that Pittsburgh, among other cities, provides that a heliport cannot be established even in an industrial district without a public hearing. Philadelphia has concluded that it will provide, operate and maintain public heliports. A pamphlet available to city planners on heliport dimensions is described.

A-079

Ashton, Winifred Diana.
THE THEORY OF ROAD TRAFFIC. John Wiley & Sons, New York, 1966. 178 pp.

The author, lecturer in statistics at the University of Leeds, approaches the subject from a theoretical standpoint although the needs of the practicing engineer are also regarded. Four main approaches to traffic flow are described: the car-following theory involving dense traffic bumper to bumper and leading to dynamic equations;

fluid analogies where the traffic is pictured as a viscous fluid. Both of the above are deterministic. A third approach uses probabilistic or stochastic models and results relating to the delay at uncontrolled (priority) and signal-controlled intersections are derived; a different approach involves simulation on a computer of a complicated traffic network. Practical applications include the optimum settings for traffic signals and methods for measuring the capacity of a highway.

A-080

Association of American Railroads. Bureau of Railroad Economics. GOVERNMENT AND PRIVATE EXPENDITURES. In: Issues in Transportation Economics. Karl M. Ruppenthal, ed. Charles E. Merrill Books, Inc., Columbus, Ohio, 1965, pp. 33-46.

Eleven tables show the expenditures by year from 1947 through 1964 (estimated) for domestic transportation, airways, airports, airline cash subsidies, highways, and waterways. The total figures include amounts for construction, operation and maintenance.

A-081

Association of American Railroads. Bureau of Railway Economics. GOVERNMENT EXPENDITURES FOR TRANSPORT FACILITIES. Association of American Railroads, Washington, D.C., March 1967.

The level of government expenditures for transportation facilities is tabulated and examined from the viewpoint that any governmental expenditures above the charges collected from the commercial users of a system, represents a subsidy to railroad competitors. The new legislation proposed by the President such as an increase in diesel fuel tax, and the use tax for heavy vehicles, a tax on fuels used on inland waterways and several new airline taxes, is described as based on the principle that those who use public facilities should bear an appropriate share of the cost of government expenditures to provide the service. Includes 11 tables on government subsidies to air, highway and waterways transportation, one showing an estimated $5.8 billion of subsidies in 1967 to these industries.

A-082

Association of American Railroads. Bureau of Railway Economics. RAILROAD MILEAGE BY STATES, DECEMBER 31, 1965. Bureau of Railway Economics. Association of American Railroads, Washington, D.C., 1966.

A statistical report summarizing mileage operated by railroads in the U.S., listed alphabetically by state. The railroads are grouped into Class I Line-haul, Class II Line-haul, and Switching and Terminal Companies. Statistics are provided for miles operated for the entire line, miles operated within the state, and per cent operated within the state. Data for Pennsylvania are presented in tables, on pages 22 and 23.

Railroad Mileage Operated in Pennsylvania

December 31, 1965

Railroad	Miles operated		Per cent operated within state
	Entire line	Within state	
CLASS I LINE-HAUL RAILROADS:			
Baltimore & Ohio RR	5 780	961	16.6
Bessemer & Lake Erie RR	201	196	97.5
Central RR Company of New Jersey	573	177	30.9
Delaware & Hudson RR	734	88	12.0
Erie-Lackawanna RR	3 007	839	27.9
Lehigh Valley RR	1 043	391	37.5
New York Central RR	9 787	761	7.8
Norfolk & Western Ry.	7 554	149	2.0
Pennsylvania RR	9 570	3 717	38.8
Pittsburgh & Lake Erie RR	212	198	93.4
Reading Co.	1 277	1 195	93.6
Western Maryland Ry.	872	239	27.4
Total Class I	40 610	8 911	21.9
CLASS II LINE-HAUL RAILROADS:			
Bellefonte Central RR	18	18	100.0
Cambria & Indiana RR	38	38	100.0
Cherry Tree & Dixonville RR	34	34	100.0
Chestnut Ridge Ry.	9	9	100.0
Cheswick & Harmar RR	4	4	100.0
Coudersport & Port Allegheny RR	24	24	100.0
Everett RR	4	4	100.0
Ironton RR	10	10	100.0
Lackawanna & Wyoming Valley Ry.	19	19	100.0
Lake Erie, Franklin & Clarion RR	15	15	100.0
Lehigh & Hudson River Ry.	98	*	**
Lehigh & New England Ry.	45	45	100.0
Maryland & Pennsylvania RR	38	37	97.4
Monongahela Ry.	168	98	58.3
Montour RR	51	51	100.0
Northampton & Bath RR	7	7	100.0
Pittsburg & Shawmut RR	97	97	100.0
Pittsburgh, Chartiers & Youghiogheny Ry.	15	15	100.0
Stewartstown RR	7	7	100.0
Strasburg RR	4	4	100.0
Unity Rys.	5	5	100.0

(Continued on next page)

Railroad Mileage Operated in Pennsylvania

December 31, 1965

Railroad	Miles operated		Per cent operated within state
	Entire line	Within state	
CLASS II LINE-HAUL RAILROADS: (cont.)			
Waynesburg & Washington RR	29	29	100.0
Wellsville, Addison & Galeton RR	80	70	87.5
Western Allegheny RR	21	21	100.0
West Pittston-Exeter RR	3	3	100.0
Winfield RR	13	13	100.0
Youngstown & Southern Ry.	50	7	14.0
Total Class II	906	684	75.5
Total Class I and II	41 516	9 595	23.1
SWITCHING AND TERMINAL COMPANIES:			
Aliquippa & Southern RR	46	46	100.0
Conemaugh & Black Lick RR	46	46	100.0
East Erie Commercial RR	12	12	100.0
Johnstown & Stony Creek RR	6	6	100.0
McKeesport Connecting RR	16	16	100.0
Monongahela Connecting RR	50	50	100.0
Philadelphia Belt Line RR	8	8	100.0
Philadelphia, Bethlehem & New England RR	60	60	100.0
Pittsburgh & Ohio Valley Ry.	21	21	100.0
Pittsburgh, Allegheny & McKees Rocks RR	11	11	100.0
Steelton & Highspire RR	32	32	100.0
Union RR (of Pa.)	275	275	100.0
Upper Merion & Plymouth RR	16	16	100.0
Total Switching and Terminal	599	599	100.0

* Less than one-half mile.
** Less than 1/10th of 1%.

A-083

Association of American Railroads. Bureau of Railway Economics.
A REVIEW OF RAILROAD OPERATIONS IN 1965, by Burton N. Behling. Special series no. 100. Bureau of Railway Economics. Association of American Railroads, Washington, D.C., 1966.

Contents include: a review of the progress achieved in 1965, the outlook for 1966, and 1965 statistics including financial results, capital expenditures and purchases, technological developments, computerization of information systems, traffic and equipment trends, employment and compensation, wage rates and prices, rates and fares legislative activity, administrative proceedings, etc.

A-084

Association of American Railroads. Bureau of Railroad Economics.
YEARBOOK OF RAILROAD FACTS, 1965-1966. Bureau of Railroad Economics. Association of American Railroads, Washington, D.C., 1965-1966.

A-085

Association of American Railroads.
YEARBOOK OF RAILROAD FACTS, 1966 EDITION. Association of American Railroads, Washington, D.C., 1967.

A-086

Association of Local Transport Airlines.
JET AGE ROUTE POLICY FOR LOCAL SERVICE AIRLINES. Report by the Association of Local Transport Airlines to the Civil Aeronautics Board, Jan. 25, 1966.

The volume of local airline service has continued to increase as evidenced by a map of the routes certificated to local service carriers, June 30, 1964. The quality of service has improved as indicated by statistics of equipment used, convenience of service, and fares. The critical factors (density of traffic, length of passenger haul, etc.) governing the revenue/expense relationship are discussed. Forecasts for 1970 under existing CAB policy indicate that plane-miles operated will increase 33% over 1965 and passenger miles will double the 1965 figure. The local airlines are turning to turbine power to provide the best in short-haul services with increased frequency, more express service, faster service, and lower fares. The economics of the new jets is discussed. Recommended changes in policy which will further improve short-haul service are: elimination of service to marginal points, based on higher "use it or lose it" standards, merger with trunks, merger between locals, improved working arrangements such as interchanges. It is stated that route strengthening offers the greatest potential for reducing subsidy while maintaining reasonable service to smaller cities. Appendices provide statistics on local carriers.

A-087

Association of Oil Pipe Lines. State Affairs and Legal Committee.
HANDBOOK OF THE STATE AFFAIRS AND LEGAL COMMITTEE. Association of Oil Pipelines, Washington, D.C., 1966(?).

Contains a membership list with addresses of the State Affairs and Legal Committee.

A-088

Automotive Safety Foundation.
ARTERIAL TRANSPORT SYSTEMS FOR PENNSYLVANIA, A REPORT TO THE HIGHWAY CLASSIFICATION COMMITTEE. Automotive Safety Foundation, Harrisburg, Pa., 1965.

B-001

Babcock, W.F.
ADMINISTRATIVE REQUIREMENTS FOR HIGHWAY CONSTRUCTION PROGRAMING.
In: Formulating Highway Construction Programs, Workshop Conference Proceedings, Sept. 19-20, 1960. Highway Research Board Special Report 62. National Research Council. National Academy of Sciences, Washington, D.C., 1961, pp. 174-182.

The paper considers the areas of responsibility of policy making groups such as legislature, governor, highway commission and the various management levels. The advance planning operation is viewed as the key to effective planning and should be a distinct administrative unit, functioning also as liaison between departments. The detailed experience of North Carolina in this area is included.

B-002

Baggaley, P.D.
REAR-ENGINED BUSES SPEED SHEFFIELD'S TRAFFIC.
Bus & Coach, vol. 37, no. 8, Aug. 1965, pp. 278-281.

The combined fleets of the Sheffield Corporation and the Sheffield Joint Omnibus Committee, operating 750 vehicles, comprise 163 rear-engined buses. Both Leyland Atlantean and Daimler Fleetline chassis are employed, carrying 76-78 seater bodywork by M.C.W., Roe, Park Royal and Neepsend Coachworks. Their popularity with passengers and staff is matched by substantial departmental economics made possible by the large number of seats available. There is a summary of experience gained with various designs.

B-003

Balas, E.
SOLUTION OF LARGE-SCALE TRANSPORTATION PROBLEMS THROUGH AGGREGATION. Operations Research, vol. 13, no. 1, Jan. 1965, pp. 82-93.

From a large-scale transportation problem (I), a smaller one (II) is derived by the aggregation of origins (destinations). A procedure is given to find an optimal solution X to problem I, starting from an optimal solution Y to problem II, and considering at each step only a small part of the original problem's data. While the proposed method is applicable to any transportation problem, its efficiency increases with (a) the size of the problem, and (b) the unevenness of the territorial distribution of origins (destinations).

B-004

Balkus, Kozmas.
TRANSPORTATION IMPLICATIONS OF ALTERNATIVE SKETCH PLANS.
In: Transportation System Analysis and Evaluation of Alternate Plans. Highway Research Record, no. 180. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967, pp. 52-70.

Six sketch plans prepared by the planning division for a region of 30 million population were evaluated for transportation implications. The aim was to gain insight into the form of transportation network which, according to the present means of

travel, would correspond to each development sketch. The patterns represent three basic patterns of regional growth: decentralized - with minimum development control; the new-town concept; and the concentration of future population in a few large urban units. The sketch plans are illustrated and factors in development enumerated. Resource commitments required for the plans are compared. Travel implications were determined in two steps: the trip-making potential for the sketches was established and estimated volumes expressed in terms relative to population increase; communities with a capacity to support public transportation were fitted with mass transit systems. Results indicate the relative growth of mass transit and automobile modes of travel.

B-005

Barber, R.J.
SAN FRANCISCO WILL TEST FOUR ATO SYSTEMS. Railway Age, vol. 157, no. 9, Sept. 7, 1964, pp. 22-23, 26.

The construction of 4 miles of new, double, test track at Sacramento Northern Railway, east of San Francisco, California and research projects for testing new concepts in automatic train operation systems control are described. Bay Area Rapid Transit District Laboratory cars, each with different trucks, propulsion and brake systems are to be tested.

B-006

Barloon, Marvin J.
THE CHANGING ROLE OF INTERCITY TRUCKING. In: Trucking And The Economy. American Trucking Associations, Inc., Washington, D.C., 1965, pp. 1-18.

Reasons for the growth of the trucking industry are examined. Growth has leveled off since 1962 when the relatively new trucking industry caught up with other transport modes. New growth reflects changes in demands for transportation. Trucking offers premium individualized service, which costs more but is valuable where small-lot shipments of high valued freight are involved. Reasons for and examples of such freight are given. The competition of other modes of transport in premium services is discussed (e.g. piggyback, air cargo). Public policy issues affecting the trucking industry are examined.

B-007

Barloon, Marvin J.
ECONOMIC POTENTIALS OF THE LAKE ERIE-OHIO RIVER WATERWAY.
In: Issues in Transportation Economics. Karl M. Ruppenthal, ed. Charles E. Merrill Books, Inc., Columbus, Ohio, 1965, pp. 10-16.

This address, given before the Mahoning Valley Industrial Council, Youngstown, presents some arguments in favor of government subsidies for the construction of this waterway. At the time the economic feasibility was still in question and the Army Engineers had not reported on anticipated costs. The author discusses potential positive effects on the economy of the region and the nation, including reduction of transportation costs of steel from Pittsburgh and Youngstown and iron ore into these cities.

B-008

Barloon, Marvin J.
THE IMPERIAL OHIO. Marine Engineering/Log, vol. 61, no. 1, Jan. 1966, pp. 54-57, 106.

The navigation system of the Ohio river is 2336 miles long and carries a large array of products including coal, industrial chemicals, crude oil, finished petroleum products, steel products and others. In 1963 the river carried 35.8% of the inland waterways tonnage in the United States. The central attraction of the Ohio river region is the low cost transportation necessary for the assembly of basic materials and fuels. The low cost of transporting coal makes electricity production cheap and thus contributes to aluminum production which requires large quantities of cheap power. The steel industry of the Ohio valley derives its competitiveness from the availability of low cost coal from the Appalachian region which contributes to employment, income, and community prosperity of these otherwise depressed regions. The recanalization of the Ohio river, scheduled to be completed in the 1970's, will eliminate congestion and open the door to lower costs and even higher traffic levels. The estimates of the Corps of Engineers of the benefit to cost ratio of this public investment range from 1.9 to 1 to 4.5 to 1, depending on the individual project.

B-009

Barmack, J. E.
METHODOLOGICAL PROBLEMS IN THE DESIGN OF MOTOR VEHICLE ACCIDENT RESEARCH.
American Journal Public Health, vol. 52, no. 11, November 1962, pp. 1866-71.

The goal in accident research should be the same as in other disease control efforts: to develop means of controlling the accident and of mitigating its consequences. The author therefore reviews some of the fundamental approaches to disease generally and examines the ways in which accident control studies have failed to provide useful information. Also, certain methodological difficulties peculiar to accident research emerge: there is little homogeneity in the properties of motor vehicle accidents; body injury and death are of greatest interest from the public health standpoint, but many studies use property damage as the criterion; "motor vehicle" as a concept lacks homogeneity; a motorcycle is uniquely vulnerable to sand and gravel on turns and a tractor trailer is peculiarly vulnerable to jackknife accidents. In many respects the study of accidents differs from the study of disease processes. The author stresses the need for direct evidence of the events preceding the trauma and the need for techniques for the collection of such data.

B-010

Barriger, John W.
AN ECONOMIC FANTASY: THE PROPOSED LAKE ERIE-OHIO RIVER CANAL.
In: Issues in Transportation Economics. Karl M. Ruppenthal, ed. Charles E. Merrill Books, Inc., Columbus, Ohio, 1965, pp. 16-33.

The author, president of the Pittsburgh and Lake Erie Railroad Company, presents the negative aspects of this waterway. (For the arguments in favor see B-007.) He estimates the cost (one ten-mile stretch at $23 million per mile), describes its economic impracticality (the savings in transportation costs would fail to meet the annual charges of the canal by $15 million). Adverse effects on the region, including losses to other Lake Erie ports, are described.

B-011

Bartholomew, Harland
METROPOLITAN TRANSPORTATION PROBLEM. ASCE Proceedings, vol. 91, (J. Urban Planning and Development Division), no. UPI, July,1965, paper 4391, pp. 7-18.

Inadequate planning in the past for the revolutionary change brought about by the automobile has swelled the prospective area for urbanization in our cities from 10 to 20 times the size possible in 1930. The increasing population has spilled into much of this area creating urban sprawl which increases the metropolitan transportation problem. Four areas are proposed for easing the problem. They include: taking advantage of the vertical dimension over the existing rights of way through e.g. double-deck roadways; re-evaluating the time dimension to stagger or spread the peak daily demands; a planning or design year which considers not just the foreseeable 20-year period but also the ultimate population and transportation needs as predicted in a "design population" for planning purposes which places the emphasis on population and land use reaching 40 years ahead or longer; a more coordinated implementation of plans permitting advance reservation of sufficient right-of-way to meet future demands when they arise.

B-012

Bauer, Kurt W.
EMERGING PRINCIPLES OF URBAN TRANSPORTATION PLANNING. ASCE Proceedings, vol. 91, (J. of the Highway Division), no. HW2, Dec. 1965, paper 4559, pp. 1-9.

The task of planning, designing, constructing, operating, and maintaining transportation facilities has become increasingly complex due to the growing size, complexity, and dynamic nature of current urban development. The following principles of urban transportation planning are emerging: transportation planning must be areawide or regional in scope; transportation planning must be conducted concurrently with land use planning, and must be based on long-range areawide land-use plans; highway and transit systems must be planned together and transportation facilities must be planned as an integrated system; both land use and transportation planning must recognize the existence of a limited natural resource base to which both urban and rural development must be properly adjusted; the land use and transportation planning process must be based on community development objectives and must scale the plans against the financial resources of the community. Current transportation planning programs use the following seven-step planning process: study organization and design, inventory and analysis forecast, formulation of objectives and standards, plan design, plan test and evaluation, plan selection and adoption.

B-013

Bay, P.N.
INNOVATIONS IN A DOWNTOWN PARKING PROGRAM. Public Works, vol. 98, February 1967, p. 118.

The author, traffic engineer of San Mateo, California, describes the new parking facilities there. Innovations included the use of air rights, building under a tennis court, direct access to the rear of stores, and convenient pedestrian easements. Convenience and aesthetics were both emphasized. Financed by ad valorem benefit-assessment proceedings, the entire project provides 609 offstreet parking spaces downtown. There are two major structures and two surface lots. The total cost per stall was $3,960.

B-014

Beckman, N.
IMPACT OF THE TRANSPORTATION PLANNING PROCESS. Traffic Quarterly, vol. 20, April 1966. pp. 159-73.

The 1962 Highway Act involves local governments and state agencies in joint planning efforts. Potentialities of continuing transportation planning process are presented. The relationship between city problems and human problems is stressed. Comprehensive metropolitan planning with coordination of local governmental activities is stressed. The Advisory Commission on Intergovernmental Relations has prepared a model state bill authorizing local governments to join together to operate regional councils of governments.

B-015

Beller, W. S.

MORE FUNDS SOUGHT FOR NORTHEAST CORRIDOR PLANS. Technology Week, vol. 20, no. 2, Jan. 9, 1967, pp. 23-4.

More money is seen necessary by the director of the Office of High-Speed Ground Transportation to handle Northeast Corridor planning due to such factors as population growth and commercialization of the scarce land in the corridor and the demonstration projects such as the highspeed Boston-New York and New York-Washington rail links. Another major demonstration project calls for transporting automobiles with their occupants by rail between Florida and Virginia to allow convenient mode transfer. The purpose of the projects is to evaluate public response to such factors as new equipment, higher speeds, variation in fares, improved comfort and convenience and more frequent service. Various propulsion methods for high speed ground vehicles are being considered with linear induction seen as most promising. In the highly built up Northeast Corridor tunneling is seen as a favored route because an other-than-straight route brings up engineering problems at such high speeds. Improvements in tunneling technology are, however, needed. The Office of High-Speed Ground Transportation is now under the DOT and its operations involve not only the demonstration projects but an engineering section to develop and improve designs and a systems planning group which is developing models to simulate traffic in the Northeast Corridor in five year increments to 1990.

B-016

Bellis, W. R. and J. E. Jones
30TH PEAK HOUR FACTOR TREND. In: Highway and Interchange Capacity, Highway Research Record, no. 27. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D. C., 1963. pp. 1-13.

One of the problems of forecasting traffic volumes is how the 30th peak hour ratio to the annual average daily traffic (AADT) reacts to an increase in the AADT. Experience has shown that the design hour volume (DHV) rate of growth is not the same as the rate of growth of the AADT. Data from 69 counting stations that have been in operation for 10 years were used for this study because they supplied ADT, DHV and DHV factors. Seven tables and nine figures present the results of the study. The conclusions are: As the AADT increases the 30th peak hour factors generally decline; the reduction rate for high 30th peak hour factors is much greater than for low 30th peak hour factors; low population areas and sparsely developed areas usually have a high 30th peak hour factor; population changes in an area influence the DHV factors, an increase in population decreasing the factors; and the capacity of a

roadway has no great influence on either DHV factors or the rate of change. It is, rather, the increase in ADT due to the increase in the off hours that tends to reduce the DHV:ADT ratio.

B-017

Benishay, Haskel and G. R. Whitaker.
TAX BURDEN RATIO IN TRANSPORTATION. Land Economics, vol. 43, no. 1, Feb. 1967, pp. 44-55.

A long-standing controversy has raged over the relative tax burdens of the regulated transportation modes. If generally acceptable conclusions could be reached on relative tax burdens, a direct attack could be made on the resource allocation implications of differing tax burdens. The objectives of this paper are to define theoretically appropriate comparative tax burden measures and, using these measures, to estimate relative tax burdens for rail and regulated motor carriers. New data developed for this study provide some resolution of the data problem. Several concepts of neutrality of taxation and of problems involved in applying these concepts to an empirical investigation are discussed. The implications of using a proxy measure, the tax burden ratio, are explored and it is concluded that useful results may be obtained by doing so. Under the criteria developed in this paper rails appear to bear from 4 to 12 times the tax burden of motors.

B-018

Bergstrom, R. N. and K. W. Hamming.
LATEST DEVELOPMENTS IN TRANSPORTING COAL BY RAIL.
ASCE-Proceedings, vol. 91 (J. Power Division), no. PO1, May, 1965, paper 4338, p. 81-91.

Recent developments of integral trains are described to show how the cost of coal transportation can be reduced by improvements in handling the scheduling of the train to minimize delays enroute. Cost reductions in coal transportation due to the utilization of integral or unit trains are described. Two arrangements for handling an integral train at a power plant are described, showing systems of train handling and automatic car dumping, without breaking the train apart.

B-019

Berkley, George.
MUNICIPAL GARAGES IN BOSTON; A COST-BENEFIT ANALYSIS.
Traffic Quarterly, vol. 19, April 1965, pp. 213-28.

Background and legislation concerning Boston's off-street parking problem are given. Findings of a 1964 cost-benefit analysis on municipal garages are presented. Expenditures, tax loss, loss to transit system and other costs are described. Income and property appreciation are given. The effect on the city's economy is explored. After evaluation, the study concluded: that garages are being subsidized by the city, expenditures exceed income and costs exceed benefits; that the profit to the city's retail industry is not measurably affected by the presence of minicipal garages; that the garages are monopolized by all day parkers; and that garages are causing more congestion than they are alleviating.

B-020

Berkowitz, N., C. Moreland and G. F. Round.
PIPELINE FLOW OF COAL-IN-OIL SUSPENSIONS. Canadian Journal of Chemical Engineering, vol. 41, June 1963, pp. 116-21.

Flow behavior of powdered coal was investigated in a one-inch diameter experimental pipeline at velocities up to about 20 feet per second. Detailed technical data are given for a bituminous and a subbituminous coal. At flow velocities greater than 2 feet per second and coal concentration below 50% w/w, the suspensions were found to move as relatively homogeneous (or quasi-homogeneous) fluids.

B-021

Billyou, Deforest.
AIR LAW. 2nd ed. AD Press, Ltd., New York, 1964.

A discussion of Federal and non-United States law on matters relating to airspace activity and airports, covering such aspects as airport noise, safety liability, offenses committed on board or related to aircraft, taxation, liens; together with some discussion of financing, etc. Selected administrative rulings, Executive Orders, extracts from Federal statutes having some application to aviation are also included.

B-022

Bingham, S. H.
HIGH-SPEED MASS TRANSPORT BY AN OVERHEAD SYSTEM.
Civil Engineering, vol. 31, Jan. 1961, pp. 61-64.

Various types of overhead systems are briefly described. Five overrunning and two suspended monorail systems are included. A comparison of these systems with the conventional subway for construction costs, noise level, speed, maintenance, and obstruction of light and air is presented.

B-023

Bisbee, E. Farnsworth.
OPERATIONS ANALYSIS FOR TRANSPORTATION SYSTEMS DESIGN. Paper available from the author at Massachusetts Institute of Technology.
Bulletin of the Operations Research Society of America, vol. 15, Supplement 1, Spring 1967, p. B-49.

The Northeast Corridor Transportation Project begun by the U.S. Department of commerce raises a number of issues that have traditionally been dealt with on an ad hoc basis, if at all, in the evaluation of ground systems for regional service. One such issue recognizes the prospect of new technology for the system design and leads to the question of how best to match traveler utility and system cost within feasible design alternatives. The spectrum of operating policies and their influence on effectiveness criteria are indicated by illustration of an explicit though limited first order model with externally fixed utilization functions. Computational results based on the model are presented and discussed.

B-024

Bitzl, F.
[The Implication of Excessive Highway Speeds for Highway Construction.] Die Auswirkungen Überhöhter Verkehrsgeschwindigkeiten fur den Landstrassenbau. (in German) Forschungsarbeiten aus dem Strassenwesen, n.f. Heft 65, 1966.

B-025

Blum, A. M.
DIGITAL SIMULATION OF URBAN TRAFFIC. IBM Systems Journal, vol. 3, no. 1, 1964, pp. 41-7

Simulation methods are given for intersections and networks, vehicular characteristics and input, and network traffic control mechanism. A general traffic program is described with data cards specifying geometry, signal settings, statistical distributions, and other details of a particular network.

B-026

Bordley, Ralph C. and C. Tennent.
APPLICATION OF CRITICAL PATH METHOD TO A HIGHWAY RIGHT-OF WAY OPERATION. In: Land Acquisition 1963. Highway Research Record, no. 54. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D. C., 1964, pp. 6-14.

The Critical Path Method (CPM), a management information and control tool, is discussed as a possible solution to the right-of-way acquisition problem. The CPM was studied as to its successful application to highway development, and a test application to a right-of-way acquisition project made and analyzed. Its use among states is noted and observations as to CPM techniques and the CPM network are discussed. An appendix provides a lengthy explanation of the standard right-of-way network with diagrams.

B-027

Bostick, T.A. and T.R. Todd.
TRAVEL CHARACTERISTICS OF PERSONS LIVING IN LARGER CITIES. In: Economic Forecasting. Highway Research Record, no. 106. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966, pp.52-57.

The travel characteristics of workers residing in cities of at least 100,000 population are examined as to choice of travel mode related to: the proximity of public transportation to work, the distance to work, and the family income of the workers. Also included are analyses of automobile trips which indicate the relationship between income and trip distribution by purpose of travel. It was concluded that the automobile was used by a large proportion of residents regardless of the availability of other modes of transportation.

B-028

Bostick, T.A. and T.R. Todd.
TRAVEL HABITS IN CITIES OF 100,000 OR MORE. Public Roads, vol. 33, no. 12, Feb. 1966, pp. 274-6.

The preferences for certain modes of transportation with respect to family income are indicated in this survey. In discussing the travel habits of persons living in cities of 100,000 or more population, information is included on the availability of the nearest public transportation to work, the distance to work, and the purpose of all trips to the downtown area. It was concluded that the automobile was used by a large proportion of residents regardless of the availability of other modes. As the size of family income increased, the choice of the automobile as a commuting mode increased. Groups having the highest and lowest income reported 22% of trips were for social and recreational purposes.

B-029

Bottiny, Walter H.
TRENDS IN AUTOMOBILE OWNERSHIP AND INDICATORS OF SATURATION. In: Economic Forecasting. Highway Research Record, no. 106. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966, pp. 1-21.

Nationwide trends in automobile ownership are examined for indication of potential growth and saturation in the ratio of automobiles to population. The growth rate in automobile ownership for Pennsylvania as related to its population and age distribution, income, housing, and use of public transportation, is presented together with similar data for Philadelphia and Allegheny Counties. Saturation points in the number of automobiles per capita appear to have been reached in a number of localities, including Allegheny County.

B-030

Bouchard, Richard J. and C. E. Pyers.
USE OF GRAVITY MODEL FOR DESCRIBING URBAN TRAVEL: AN ANALYSIS AND A CRITIQUE. In: Travel Patterns. Highway Research Record, no. 88. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 1-43.

An evaluation of the gravity model as an analytic tool for the simulation of present and the forecasting of future urban trip distribution patterns. The evaluation was made by comparing gravity model trip interchanges with those found in home interview destination and origin surveys (Washington, D.C., 1948, 1955). The 1955 survey data were used to calibrate the basic gravity model and then for testing the model's ability to simulate current travel patterns. The 1948 survey provided data with which to analyze the forecasts made by the calibrated model. The authors conclude from their study that the gravity model will give satisfactory results if properly calibrated and tested. This paper is a condensation: the full report can be obtained from the U.S. Bureau of Public Roads, Washington, D.C.

B-031

Bouladon, Gabriel.
THE TRANSPORT "GAPS". Science Journal, vol, 3, no. 4, April 1967, pp.41-46.

The lack of efficient urban transport is the "Achilles heel" of the new era. It holds back town planning, increases housing costs and leads to a waste of energy and money. It is essential to provide improved means of transport adapted to new living and working conditions. There is a profusion of new means being developed. One of the most pressing problems is to fill the gaps between them. Each mode of travel has an optimum speed/distance ratio. It is inefficient to cover long distances on foot, just as it is unsatisfactory to use a car for short distances at low speeds. Experiments are being conducted by the Institut Battelle (Switzerland) on a Continuous Integrated Transporter which combines an escalator-type Integrator (which takes the passengers to the moving platforms) with a continuous moving Transporter (which carries the passengers between the stations). The advantages include lightweight equipment, small tunnels and simple operation. Existing subways could be adapted to the system, allowing them to carry far more passengers than they do now.

B-032

Boyd, R.M.
THE USER'S NEED FOR EFFECTIVE TRANSPORTATION. In: Issues in Transportation Economics. Karl M. Ruppenthal, ed. Charles E. Merrill Books, Inc., Columbus, Ohio, 1965, pp. 307-315.

In this talk given in 1961, the author traces the changes in transportation from regulated to non-regulated. In 1946, 80% of the inter-city freight ton miles were carried by regulated rail and truck carriers. By 1959, the regulated portion had decreased to 69% and the non-regulated to 31%. The rate of increase for non-regulated was estimated at about 1% per year and private transportation accounted for all the increase in inter-city freight transportation in the recent period. Private transportation is not the complete answer but commercial transportation must exercise creative imagination in devising new low-cost and expeditious ways of delivering goods.

B-033

Brady, R.P. and J.E. Walsh.
EFFICIENCY CRITERION FOR COMPARING CARGO AIRCRAFT IN DELIVERIES BETWEEN TWO TERMINALS. Operations Research, vol. 8, May 1960, pp. 356-61.

The ability of a given cargo aircraft and cargo-handling system combination to perform a specified task can be influenced by a large number of factors, the more important of which are identified. A quantitative criterion for measuring the relative efficiency of combined air-cargo systems is defined as proportional to: (Revenue from delivery)/(Prorated expense of this delivery). The factors are defined and the notation given for an efficiency criterion. Although developed for the case of two air-freight terminals, this criterion may be useful for situations involving many terminals.

B-034

Branch, Melville Campbell.
TRANSPORTATION DEVELOPMENTS, CITIES, AND PLANNING. American Society of Planning Officials. Chicago, 1965.

B-035

Brancker, J.W.S.
FUTURE RELATIONSHIPS BETWEEN AIR AND GROUND TRANSPORT: CORRESPONDENCE. Journal Royal Aeronautical Society, vol. 69, Jan. 1965, p. 63.

A letter to the editor commenting on the article in the November, 1964 issue on this subject. It is pointed out that three separate principles were discussed in the original paper. The use of a smaller vehicle, regardless of whether a removable passenger capsule is employed, must result in some economic loss even over a range of 3000 nautical miles. The author of the original article may have been trying to stress that a passenger capsule, capable of being quickly transferred from one aircraft to another, may make it unnecessary to design a supersonic aircraft with ranges of more than 3000 miles. There is merit in the construction of an aircraft fast enough to achieve a high rate of utilization without having to fly at inconvenient times, but this only shows an economic improvement if increases in costs due to higher speeds can be offset by higher utilization. The removable passenger capsule implies the use of standard units on a worldwide basis. This may be essential in the case of a large carrier or a group of smaller ones, but it is unlikely universally. The question: can agreements be reached for all supersonic aircraft to be so constructed that they can carry two or more standard capsules, and many other practical points are raised. Finally, it is pointed out that for some time supersonic and subsonic aircraft will be sharing the same airports and facilities.

B-036

Bratkowski, W.V.
RAPID TRANSIT SYSTEM ENVIRONMENT. Journal of Environmental Science, vol. 10, April 1967, pp. 20-7.

B-037

Brewer, S.H.
THE COMPLEXITIES OF AIR CARGO PRICING. Graduate School of Business Administration, University of Washington, Seattle. 1967. 18 pp.

While the direct operating cost of flying cargo has been reduced 50% by jet cargo aircraft, there is a possiblity of a further reduction of 30-35% when jumbo jets are introduced. Ground handling costs may be reduced by 60-80% by the use of mechanized and automated terminals. Air cargo will thus become competitive with surface transportation for many products. In moving from small-scale to large-scale freight transportation the air carriers must reorient and redesign their pricing structure to insulate themselves from pressures and still produce the necessary profits. Freight transportation is a leverage business: pressures for downward adjustment and equalization of prices come from sales personnel, communities promoting industry, traffic personnel, over-zealous associations and consultants. There will also be competition within the industry from convertible twin jets, tri-jets and propellor driven aircraft. There will be pressure to price to the levels of the most economic aircraft and other pressures to protect the least economic when operated by different carriers. There

will be many complex objectives to be served by the pricing structure. These are outlined and the implications of each discussed.

B-038

Brewer, Stanley H. and D.T. DeCoster.
THE NATURE OF AIR CARGO COSTS. Graduate School of Business Administration, University of Washington, Seattle, 1967.

A major reason for the growth of air cargo operations is the reduction in costs. Cargo jets have converted what were once all-cargo operating losses into profits. Moving cargo in the DC-7 and the turbo-prop-powered CL-44 costs 10.06¢ per available ton-mile respectively while the DC-8F and B-707-320C costs are 3.64¢ and 3.68¢ per ton-mile. This radical drop was caused by the technological revolution now in progress. The B-747 may have costs of about 2.75¢ per ton-mile. All-cargo operations at present are suffering from attempts to obtain a profit with piston planes. Ground handling operations can be made more efficient with increased mechanization and automation. The effectiveness of these in reducing costs depends only on an increase in volume to lower the average fixed cost per unit of cargo handled. The requirement that airlines operating cargo equipment report detailed information offers hope for more accurate future costing. Adequate information is necessary for the development of a cargo-oriented industry. Comparisons of the costs of air and surface transportation of freight are presented.

B-039

Brie, R.A.C.
EXPERIENCES WITH AN OPERATIONAL HELIPORT. J. Royal Aeronautical Society, vol. 64, July, 1960, pp.399-407; DISCUSSION, pp. 407-12.

The heliport, on the south bank of the Thames, is experimental. It used the airspace over the river to provide convenient access to the densely populated central London area. Staff, air traffic control, night flying facilities, customers facilities, legal liability, economics, noise, plans are discussed.

B-040

Brown, B.
ECONOMICS AND FINANCE IN AIRPORT PLANNING. ASCE-Proceedings, vol. 90, (J. Aero-Space Transport Division), no. AT2, Oct. 1964, paper 4080 pp. 197-202.

A planning function is outlined that involves economic and technical research. Traffic data, airport movements, and runway utilization are criteria used to determine the "economic value". Airports should be engineered in an economic atmosphere capable of fully supporting projects, and industrial development of airport lands could be suitable for financing by private enterprise.

B-041

Brown, D.A.
DOWNTOWN VTOL SERVICES FACES OBSTACLES. Aviation Week, vol. 86, no. 4, Jan. 23, 1967, pp. 101, 103, 107.

A recent study by the National Aeronautics and Space Administration (Langley Research Center) has shown that the basic problem of conducting a high-angle approach to a small area under Category 2 weather conditions may be much more difficult than is generally believed. Lack of adequate instrument landing systems, cockpit displays, and piloting techniques may hamper such service, which, it is believed, may be the answer to many urban problems related to airport congestion and access.

B-042

Brown, David A.
FAA PROPOSED SWEEPING USE FEES; AGENCY SEEKS CHARGES FOR LICENSING AND CERTIFICATING AIRCRAFT, PILOTS; BROAD AUTHORITY TO OBTAIN DATA ON FLIGHT, GROUND CREWS. Aviation Week, vol. 86, no. 18, May 1, 1967, p. 26-27.

In keeping with a policy of user charges for services rendered, the Federal Aviation Administration has proposed a wide range of fees (from $244,000 for a pressurized aircraft weighing more than 55,000 lb. to $160 for a balloon) for certifying aircraft and new licenses for pilots, mechanics, instructors, or other personnel. Old licenses would be invalid after a two-year period. No new tests would be required for present license holders, but information would have to be given on an application blank (name social security number, employer's name, kinds of certificate held, etc.).

B-043

Brown, D.A.
HELICOPTER LINE SEEKS EXPANSION FORMULA. Aviation Week, vol. 86, Jan. 9, 1967, pp. 71-72, 75, 77.

The beginnings of a regional or national commuter air service are being developed in Boston by Air General, Inc. Founded in 1962 as Massachusetts Helicopter Airlines, it currently operates five helicopters which will be converted to turbine-power by late 1968. Factors considered essential to success: all ground transportation to be eliminated from the air traveler's itinerary; ground facilities to be established wherever business is likely. Frequency of service will, it is stated, generate more passengers than will larger-capacity helicopters. Half of the 40 helistops are considered public, and are generally located in motel parking lots. Although not profitable at present, scheduled passenger traffic is considered the long-term key to success.

B-044

Brown, D.A.
HELICOPTERS SHOWING STRONG RISE IN CORPORATION SALES. Aviation Week, vol. 86, no. 10, March 6, 1967, pp. 306-311.

The growth of light, relatively inexpensive, turbine powered helicopters is expected to result in more extensive business use of the craft. Continuing corporate experience with helicopters is seen as reducing the initial resistance to executive use of single engine aircraft and the relatively large number of rotary-wing pilots currently being trained by the military is expected to be a factor in increasing sales. Also

the trend to geographic diversification in industry is tending to increase the need for rapid inter-plant and inter-regional transportation. Other potential used are in the air cargo industry and in the off-shore oil development industry.

B-045

Bruck, H.W., H. Putman, and W.A. Steger.
EVALUATION OF ALTERNATIVE TRANSPORTATION PROPOSALS: THE NORTHEAST CORRIDOR. Journal American Institute Planners, vol. 32, no. 6, November 1966, pp. 322-333.

The measurement and evaluation of the indirect consequences of alternate transportation investments in the Northeast Corridor are a subsystem of a total study. This paper describes the role of impact modelling effort within the context of the total study and explains how the demographic, economic, and land use consequences are estimated and then how these forecasts are themselves evaluated. The role of decision makers in this system seems to be that of choosing between feasible, preferred (in the economic sense) transportation systems when given the estimated costs and estimated benefits in a total framework. The criteria established for the various phases of the effort, together with the limitations of the approach used, are discussed.

B-046

Bugge, W.A.
ROAD TO HIGHWAY COOPERATION; LIAISON ON RIGHT-OF-WAY IN PROBLEMS BETWEEN UTILITIES AND HIGHWAY DEPARTMENTS. American Gas Association Monthly, vol. 42, July-Aug. 1960, pp. 19-20.

The mutual interests of the utilities and of highway departments in occupying rights of way are indicated. Controlled access highways complicate the usual arrangement since servicing the utility lines may create problems by interfering with traffic flow. The policy of the accommodation of utilities on the defense- and national system of interstate highways as adopted by the American Association of State Highway Officials and the U.S. Bureau of Public Roads is, in general, to deny permission for such accommodation. This policy may result in an increase in the cost of utilities for they are going to have to pay for their own rights of way. The case for the utilities is summarized, as is that of state highway departments. The public interest is stated to lie in cooperation.

B-047

Bulban, E.J.
BUSINESS AIRCRAFT SALES RISE FORECAST. Aviation Week, vol. 86, no. 3, Jan. 16, 1967, pp. 88-89.

In 1966 U.S. business aircraft manufacturers (such as Beech, Cessna, and Piper) delivered 15,700 new aircraft and their retail sales volume was more than $500 million. In 1967 it is expected that there will be more units sold and more gross volume due to increased sale of light and medium twins. A major concern for the industry is an acute shortage of labor. Costs for materials and for other items are going up. Competition results in increased spending for Research and Development. A table presents the shipments by type for each of the manufacturers.

B-048

Burch, Jr., Philip H.
HIGHWAY REVENUE AND EXPENDITURE POLICY IN THE UNITED STATES.
Rutgers University Press, New Brunswick, New Jersey, 1962.
315 pp.

An analysis of the financing and administration of the highway system of the United States, including facts and figures on highway taxation, state and local highway administration, and expenditure policies, legislative attitudes, laws and practices of individual states at both the state and local levels, and the influence of pressure groups in the allocation of funds. The author discusses the question of quality both in planning and construction and comments on methods of collecting and expending highway revenues. He feels that the metropolitan areas have suffered from inequities of taxation and state allocation of revenue and urges long range planning and policy changes to meet the growing crisis. Includes lengthy notes on each chapter, 26 tables and a selected Bibliography.

B-049

Burns, H.C. AND M.A. Warskow.
OPERATIONAL PLANNING FOR GENERAL AVIATION FACILITIES AT AIRPORTS.
Journal of Aircraft, vol. 1, no. 6, Nov. - Dec. 1964, pp. 345-9.

Airborne Instruments Laboratory has developed guides for the Federal Aviation Agency of the type illustrated below, to be used to determine the utility of separate secondary runways and the resulting increase in airport capacity; tabular and graphic material show runway layouts and resulting increase in airport capacity as the secondary runway is lengthened from a minimum of 2200 ft. to lengths equalling those of primary runways.

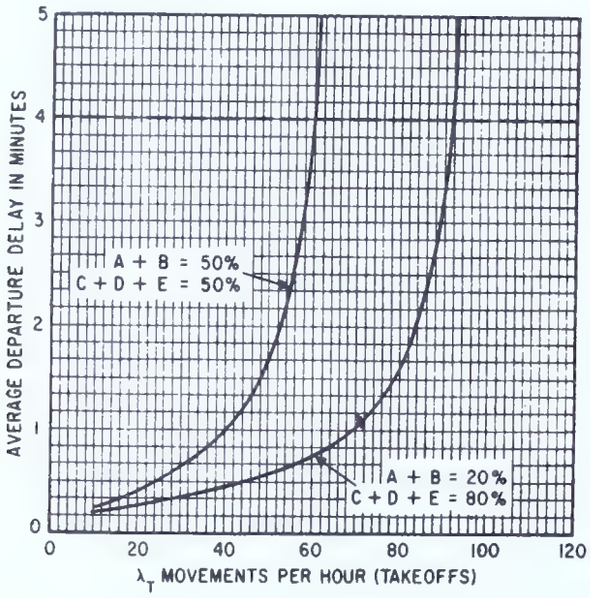


Fig. 1 Effect of population on capacity.

B-050

Butas, L.F.
SIMULTANEOUS DIFFERENTIAL EQUATIONS FOR TRIP DISTRIBUTIONS.
Traffic Quarterly, vol. 20, no. 2, April 1966, pp.248-67.

Demonstrates an easily programmed optimization technique that gives a unique solution for the trip distribution problem through the numerical solution of parametrically linear or, if desired, nonlinear simultaneous differential equations. The distributional hypothesis employed assumes dynamic interdependence between zones with respect to their respective abilities to generate and to attract trips. The procedure for calibration of a dynamically interdependent model is given.

B-051

Byrd, L.G.
ENGINEERING APPROACH TO HIGHWAY MAINTENANCE PROGRAMMING.
Public Works, vol. 96, no. 2, Feb. 1965, pp. 91-3.

The procedure for surveying and analyzing present and future payment conditions, and for planning reliable long range maintenance programs to meet them is described. The procedure was used to develop a 15-year major maintenance program for the New York State Thruway Authority and a similar long range heavy maintenance program for the northern section of the New Jersey Garden State Parkway. AASHO Road Test formulas, the Pavement Serviceability Index concept and the CHLOE Profilometer were used.

C-001

California. Legislature. Senate. Fact Finding Committee on Natural Resources.
STATE PARKS VS. FREEWAY CONSTRUCTION, AND ESTABLISHING PARKWAYS IN HIGHWAY DEVELOPMENT. Hearings, San Francisco, Dec. 16-17, 1964. (Sacramento? 1964?)

C-002

Campbell, E.W.
SOCIAL AND ECONOMIC FACTORS IN HIGHWAY LOCATION. ASCE Proceedings, vol. 92, (J. of the Highway Division), no. HW2, Oct. 1966, paper 4926, pp. 35-48.

Only after proper weighing and evaluation of all contributing factors, direct and indirect as listed below, can highway location be determined. Social and economic factors fall into four basic categories: user-direct, i.e. the benefits or costs that accrue to users of highways, measured in direct money terms; indirect-user, i.e. intangible benefits and costs; nonuser-direct, i.e. charges which accrue to persons who do not use the facility, but whose living environment is affected by its presence; nonuser-indirect, i.e. intangibles which accrue to the community in general. Individual route considerations are discussed and nine elements of traffic improvememt are enumerated. The impact on existing communities is measured in terms of direct displacement resulting from right-of-way and disruption to the community.

C-003

Campbell, M.E.
PHYSICAL AND ECONOMIC RATING METHODS FOR PRIORITY CONSIDERATIONS.
In: Formulating Highway Construction Programs, Workshop Conference Proceedings, Sept. 19-20, 1960. Highway Research Board Special Report 62. National Research Council. National Academy of Sciences, Washington, D.C., 1961, pp. 75-94.

Priorities are determined from comparisons of ratings with needs and available funds. A discussion of the factors in a composite numerical adequacy rating system used as a basis for transforming ratings into priorities is given. Suggested elements in the system are: user benefits in relation to cost; sufficiency; deficiency; cut-off points for tolerable need and noncritical deficiencies should coincide. Need for further economic and operations research to provide suitable weighting schemes is stressed. (8 charts, 39 refs)

C-004

Campbell, M.E.
TOWARD A STRATEGY OF HIGHWAY RESEARCH ADMINISTRATION.
Traffic Quarterly, vol. 21, Jan. 1967, pp. 139-155.

The author's strategy for highway research is treated in several aspects. One of these is program formulation, in which resources are matched with needs and an acceptable program is established for support and funding. It is recommended that structuring be approached by seeking out the mission of the department as a whole, and by spectra of the inanimate energies and matter. The roles of the three people responsible for highway research: the administrator, the engineer, and the research administrator, are stated in detail. Other aspects of strategy are: program frame-

work, the project statement, the research plan, research surveillance, and the research report. The author emphasizes the need to have a policy statement to put research effort into context with the whole highway development effort, to ask the most important questions because of limited research resources, to understand the role of the participants, and to maintain a closed-circuit cooperative among administrator-engineer-researcher.

C-005

Carr, Braxton B.
OUTLOOK ON THE WATERWAYS: A DRAMATIC RESURGENCE. Marine Engineering/Log vol. 61, no. 1, Jan. 1966, pp. 46-49 .

The author, president of The American Waterways Operators, Inc. states that: since World War II, traffic on the waterways increased by 317% and in 1964, 9.6% of the total carriage provided by all means of transportation was provided by inland waterborne commerce. The 80,000 persons employed in the industry move 14.6% of the nation's intercity freight tonnage. The waterways improvement programs permitted the industry to realize this potential and recent proposed legislation to license navigationl personnel on the vessels and provide for inspection of the vessels is looked upon as posing a threat to the industry by causing higher labor costs and increased vessel construction costs. Also, proposals to relieve the Corps of Engineers of their responsibility in the area and transfer it to the Department of Natural Resources and recent presidential statements calling for greater reliance on the forces of competition in transportation and for revamping regulatory laws and changing minimum rate legislation, are looked on as threats to the industry.

C-006

Carroll, Jr., J.D.
NEW WAYS TO SEE LAND USE AND TRANSPORTATION. Civil Engineering (NY), vol. 34, no. 8, Aug. 1964, pp. 62-3.

Problems associated with keeping all parts of the structure of large metropolitan areas interconnected and functioning are discussed; together with the needs of people which dictate desirable land-use patterns. These in turn will indicate the design of the transportation system. The traffic factor is to be considered in assessing any land development plan.

C-007

Carter, J.W.
U.S. CARGO GROWTH RATE LAGGING. Aviation Week, vol. 86, no. 20, May 15, 1967, pp. 36-37.

A series of specific comments by officials of the air freight companies as to their present operation, the relationship to their operations last year, and the reasons for the increase or decrease. The airline strike in the summer of 1966 and the resulting shift of business to other carriers is blamed for the decrease in some instances. American, for example, in the first quarter of 1967 experienced a growth rate for freight of only 6.1% compared to 36% for all of 1966. Severe weather was blamed by certain carriers. A table gives the annual air cargo growth rate by month from October 1965 through February 1967 in terms of freight revenue ton-miles for total domestic operations, total trunks, and total domestic all-cargo carriers.

C-008

Case, C.L.
A CRITICAL APPRAISAL OF TRANSPORTATION SURVEYS. J. of the Institution of Municipal Engineers, vol. 93, no. 11, Nov. 1966, pp. 364-70.

In order to establish a sound theory of traffic generation and prediction, one must first investigate and understand the composition and nature of traffic, its cause and growth. Transportation surveys can be grouped as follows: the general survey of all types of transportation in an urban area; transportation surveys from areas of specific land use; and surveys of specific modes of transportation. The main tool of transportation surveys is the home interview survey complemented by roadside interviews and interviews of passengers on public service vehicles. Factors affecting prediction --social habits, vehicle growth, accuracy of mathematical models--are analyzed. The use of computer simulation for deciding mode of transportation is described. The use of the grid system for recording all trips is recommended. A comprehensive simulation prognosis can be divided into the following stages: survey, record of present travel, projection, record of future travel, and design. Surveys from areas of specific land use, traffic generation from industry, and surveys of specific methods of transportation are discussed.

C-009

Case, C.L.
JUSTIFICATION FOR SEGREGATION OF VARIOUS FORMS OF TRAFFIC.
Chartered Municipal Engineer, vol. 91, no. 9, Sept. 1964, pp. 313-20.

Problems associated with segregation as a traffic engineering measure in general, and segregration of home-based trips to industrial and central area locations in particular, are discussed. The theory of traffic problem solution by means of simultaneous use of horizontal and vertical segregation is analyzed. It is emphasized that by separation of traffic making the journey to work into its main component parts, coupled with judicious location of work places, efficient urban highway networks can be created.

C-010

Cassidy, William F.
THE $25 BILLION ROLE OF THE ARMY ENGINEERS. Marine Engineering/Log, vol. 61, no. 1, Jan. 1966, pp. 64-68.

There are approximately 19,000 miles of inland waterways in the U.S. in commercial use of which 12,000 miles are of the 9 ft. depth required for modern barge movement. The Corps of Engineers has constructed or improved over 500 commercial harbors on the Great Lakes, the seacoasts and the river systems. Over the last decade the annual appropriation for overall water resource development has increased 600%, and major development projects are underway on the Mississippi, the Ohio, the Illinois, the Arkansas and Verdigris Rivers, the Missouri, the Sacramento, the San Joaquin, Columbia and Snake Rivers. Construction of the 185 mile, 12 ft. high, level Cross-Florida Barge Canal from the Atlantic to the Gulf was started in 1964 and further projects are being promoted because the waterways system can be developed with the result of reducing the costs of cargo movement and enlarging the transportation potential without taking more land. A chart showing tonnage on representative waterways in the U.S. shows that in 1964 the Delaware River and tributaries carried 108 million tons, and the Ohio River 96 million tons, as compared with the Mississippi River which carried 164 million tons.

C-011

Champlin, J.D. and W. J. Eggington.
NEW YORK CITY AND AIR CUSHION VEHICLE-CHALLENGE TO ENGINEER.
SAE-Paper 650418 (Metropolitan Sec.) for meeting March 18, 1965. 11 pp.

Review of air cushion development; consideration of present vehicles and operational achievements; analysis of possible application of vehicles representative of present state-of-the-art on specific route applications are discussed. The use of three different types of vehicles is analyzed for use in the New York area. A 20-passenger annular jet vehicle fitted with 4 foot flexible trunks and a 90-passenger plenum multicell vehicle, fitted with 3 foot flexible skirts are considered for the downtown-LaGuardia route; 600-passenger vehicle is selected for the downtown Manhattan to Stamford, Connecticut route. Operating economics are included.

C-012

Cherington, P.W.C.
FUTURE OF TRANSPORTATION AND REGULATION. ICC Practioner's Journal, vol. 33, Oct. 1965, pp.5-26.

C-013

Christopher, P.
COAL PRODUCTION AND RAIL SHIPMENT FREED FROM SHIP SCHEDULES ON GREAT LAKES. Coal Today & Tomorrow, vol. 19, no. 3, March 1965, pp.4-5.

The large coal shiploading facility under construction at Conneaut, Ohio, is intended to make coal production independent of seasonal lake transportation. Railroad schedules will no longer have to coincide with coal ship schedules. The coal handling system will include a 3600 tph stockpiling system and a 5000 tph ship-loading system. The stockpiling system includes: six track hoppers, a 60 in. belt conveyor, and a traveling stacker. Reclaiming is accomplished by a bucketwheel coal reclaimer and by two reclaiming hoppers.

C-014

Church, Donald E.
IMPACT OF SIZE AND DISTANCE ON INTERCITY HIGHWAY SHARE OF TRANSPORTATION OF INDUSTRIAL PRODUCTS. In: Freight Transportation Economics. Highway Research Record, no. 175. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967, pp. 1-8.

Data from the 1963 Commodity Transportation Survey of The Census of Transportation are used to illustrate the relationship between the highway-carrier share of transportation of industrial products and commodity, size of shipment, and distance. The variations in the highway share associated with one factor at a time as well as with all three factors jointly are examined. Size and distance factors accounted for most of the variability in highway share, with commodity becoming significant for large shipments. The results suggested that the volume of highway intercity traffic may increase or decrease substantially without a corresponding change in total output or demand for products.

C-015

Church, Donald E.
VOLUME AND CHARACTERISTICS OF INTERCITY TRAVEL DURING WINTER 1963. In: Top Issues in Urban Research 1963. Highway Research Record, no. 64. Highway Research Board. National Research Council National Academy of Sciences, Washington, D.D., 1963, pp. 100-105.

Personal interviews of about 6,000 households in the U.S. by the National Travel Survey revealed that about 90 percent of all intercity travel during the first three months of 1963 was by highway, automobile, or bus. About one-half of this highway travel was to places more than 100 miles away from home. The appendix describes the layout of punch cards used in the survey.

C-016

Claffey, P.J.
PLANNING RAPID RAIL SERVICE FOR INTRA-URBAN TRAVEL. Traffic Quarterly, vol. 17, Oct. 1963, pp. 503-15.

With the growing urbanization of the United States, the problem of transportation to and from the central business districts of the old cities will become more pressing. Considerations and methods for transportation planning are outlined. Elements of the planning process are discussed, e.g. an inventory of present facilities, need survey, effect of alternative plans, and others. Level of service to be provided must be decided; various aspects of service such as comfort, convenience, fares, and travel time are discussed. A procedure for planning rapid rail transit incorporating the above planning elements is presented in detail.

C-017

Claffey, Paul J.
RUNNING COST OF MOTOR VEHICLES AS AFFECTED BY HIGHWAY DESIGN. National Cooperative Highway Research Program Report 13. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

Actual field measurements of fuel consumption of a standard passenger vehicle were made with the aid of a precise electronic fuelmeter. More than 4,000 test runs were conducted in which fuel consumption rates were measured at various speeds ranging from 10 to 80 mph. The fuel consumption and vehicular speeds were further related to pavement types and to roadway grades ranging from plus 8% to minus 8%. A study was also made of the fuel and time consumption of the survey vehicle during normal deceleration and acceleration for the various speed ranges. The results are presented in tabular form. Methods of measuring tire wear are evaluated and results of a field test conducted with the survey vehicle on a 65 ft. radius curve driven at 20 mph are discussed. Special studies were included to determine the effect on the accuracy of fuel consumption measurements of: wind velocity, vehicle weight, fuel characteristics, operating efficiency, and driver techniques.

C-018

Clark, Evert.
HUD TACKLES THE URBAN TRAFFIC MESS. Astronautics and Aeronautics, vol. 4, July 1966, p. 5.

Los Angeles, the Federal government and an assortment of companies are cooperating to explore the feasibility of coordinate use of a monorail train and helicopter that the city calls the Skyrail-Skylounge concept for transportation to and from airports. Administered by the new Los Angeles Department of Housing and Urban Development, the project will be funded by municipal, federal and commercail grants, the total cost amounting to approximately $734,000.

C-019

Clinton, A.C.
HOVERCRAFT NOISE. Hovering Craft & Hydrofoil, vol. 4, no. 4;5, Jan. 1965, pp. 23-6; Feb. p. 25.

This review considers external far field noise generated by Hovercraft which affects terminal area and residential communities as well as internal noise affecting crew and passengers. The external near field noise affecting hovercraft structures and equipment is also considered. Vehicle design, propulsion system, arrangement of cabin, etc. are taken into account. The possibilities of attenuation of sound are discussed with reference to construction and materials.

C-020

Cogan, F.
POSSIBLE SOLUTIONS TO IMPROVE NEW YORK AIRPORT ACCESS CITED. Aviation Week, vol. 86, no. 18, May 1, 1967, p. 33.

Clayton D. Peavey, acting chief of the Central Planning Division, Port of New York Authority, has stated that airport access facilities are economically unjustified unless they form a part of an integrated area transportation system. Even an airport-central business district route as heavily travelled as the one between Manhattan and Kennedy Airport does not now generate enough traffic to support a system devoted exclusively to airport-city transportation. A highway/rail vehicle has been tested at up to 50 mph and found feasible. Mass transit system solutions such as limited use highway lanes for buses and airport vehicles only, may be possible. Helicopters are not the answer because their cost of operation is such that there is little chance for them to make a dent in the problem of moving passengers to and from airports. Hydrofoils and air-cushion vehicles need more technical development before they can provide primary service at an attractive cost. Monorails are the least likely candidate; the expense of the right of way and the incompatibility with existing systems are the drawbacks.

C-021

Coleman, Robert R.
A STUDY OF URBAN TRAVEL TIMES IN PENNSYLVANIA CITIES. In: Motor Vehicle Speed, Volume, Weight and Travel Time. Highway Research Board Bulletin 303. National Research Council. National Academy Sciences, Washington, D.C., 1961, pp. 62-75.

Traffic congestion or vehicular delay is a logical factor in the determination of new highway construction sites. Therefore comparable data are necessary. This study is an investigation of methods by which traffic congestion can be estimated when only limited information is available. State highways in urban areas were considered. Limited access expressways were not. The effect that many variables (traffic volume, traffic controls and regulations, classification of streets, percentage of heavy vehicles, street width, and type of area) have on travel time was measured. Trip times were sampled through 15 test sections in five cities. The relationship between travel time and volume/capacity ratio was found to be the most useful method for estimating travel time. This study is limited to developing estimating factors. Their application to a statewide evaluation of relative traffic congestion for programming new construction is not included.

C-022

Commonwealth Conference on Community Development.
PROCEEDINGS OF THE COMMONWEALTH CONFERENCE ON COMMUNITY DEVELOPMENT: PROBLEMS & PROSPECTS. Edited by Roy C. Buck and R.A. Rath. Pennsylvania State University, University Park, Pa., 1965.

A compilation of speeches by governmental officials and members of the academic community, almost exclusively from Pennsylvania, on community development, discussing its relationship to the university, its philosophy, definition, ingredients, crises facing cities, rebuilding the urban environment, land use, economic development, intergovernmental relations and cooperation.

C-023

Commonwealth of Pennsylvania.
PITTSBURGH AREA TRANSPORTATION STUDY. FINAL REPORT. IN TWO PARTS. VOLUME I. STUDY FINDINGS. VOLUME II. FORECASTS AND PLANS. Commonwealth of Pennsylvania. County of Allegheny. City of Pittsburgh. In cooperation with U.S. Department of Commerce. 1961, 1962.

A comprehensive study involving chapters on travel characteristics, land use, trip generation, travel facilities with a summary and conclusions. 67 tables, 71 figures and 27 maps in Volume I. Volume II projects the data into 1980 and describes anticipated urban growth, particularly in land use; future trips by auto, truck, and public transit; and highway and rapid transit planning. Conclusions and recommendations are detailed. 64 tables, 65 figures, and 39 maps in Volume II.

C-024

CONSAD Research Corporation.
DESIGN FOR IMPACT STUDIES; NORTHEAST CORRIDOR TRANSPORTATION PROJECT. Prepared for the U.S. Department of Commerce. CONSAD Research Corp., Pittsburgh, Pa., August 1965.

CONSAD Research Corp. participated in the planning of economic and demographic impact analyses, the development of impact models, and measures of indirect benefits and costs of changes in the regional transportation network. In Phase I a set of operational models to evaluate proposed transportation systems in the Northeast Corridor was produced which were to provide the types of analysis previously carried out in similar regional studies. Phase II will incorporate more complex models which relate processes of socio-economic change and network link staging. Phase I used the concept of accessibility, reflecting the consequences of changes that result from changes in transportation networks. Phase II concentrates on comparative and absolute interregional advantage, interregional resource allocation, and non-transportation policies. Model-selection criteria are presented.

C-025

Costantini, R.
ECONOMICAL LONG DISTANCE PIPELINING OF MINERALS IS NOW REALITY. Metal Mining & Processing, vol. 1, no. 11, Nov. 1964, pp 26-9, 36.

A proposed 1300-mile pipeline to transport potash would extend from newly developed potash mines in Saskatchewan to the Chicago area and would transport 2 million tons/year of mineral as a fine slurry in saturated bring. An outline of design and operating procedure for a potential 500-mile pipeline to transport 10 million tons/year of beneficiated magnetite concentrates as a slurry from the Mesabi region to the Chicago area. Costs of pelletizing should be considerably reduced when done at the steel mill due to low costs of fuels, additives and supplies.

C-026

Courtney, A.L.
SOME FACTORS AFFECTING FARES. J. Royal Aeronautical Society, vol. 69, no. 659, November 1965, pp. 727-732.

A paper read at a symposium on Cheap Short-Range Air Transport. Short-range is defined as being 250-500 miles and cost and exchange rates are quoted for that order of range. Technical standards are discussed. The effect on fare of a 10% improvement in various areas open to the designer's skill, of changes in first cost, scheduled maintenance, unreliability, specification requirements (field length, design range, furnishings, galleys, etc., design seating capacity), operational factors are discussed, and their potential individual and combined effects shown; the combined effect of all charges being estimated at 20%. There is a distinct possibility for cheap short-haul air transport and, because of international competition with fixed fares, a specialized aircraft (an autobus) is most likely to appear first on domestic services. The full benefits of a specialized new design depend upon how soon operators begin to think along these lines and how short-haul traffic grows.

C-027

Covault, D.O. and R.C. Kirk.
INFLUENCE OF OFF-RAMP SPACING ON TRAFFIC FLOW CHARACTERISTICS ON ATLANTA FREEWAY AND ARTERIAL STREET SYSTEM. In: Freeway Operations. Highway Research Record, no. 59. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964, pp. 39-52.

A study was made of off-ramp spacing, in which analysis of variance techniques was used to make comparisons of volumes, speeds, densities, over-all travel, and over-all travel time data observed on streets and freeways within the system. It was found that off-ramps leading to the central business district of a city should be spaced as close together as possible, consistent with design factors and ability of surface streets in the vicinity of the off-ramp to accommodate traffic flow from the ramp.

C-028

Curry, D.A.
USE OF MARGINAL COST OF TIME IN HIGHWAY ECONOMY STUDIES. In: Engineering Economy 1963. Highway Research Record, no. 77. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 48-120.

The preliminary results of a field study, on the cost of passenger car time savings, which was carried out to determine the appropriate hours-to-dollars conversion factor for analysis and evaluations of alternative highway locations and designs, are given. Traffic projections, economy studies, and planning reports for current and future construction projects were examined in several states and costs of road users' time savings were computed on two alternate bases. The results were considered from the standpoint of improving data available to state highway departments for decisions about construction project alternatives and priorities. 34 refs.

D-001

Dansereau, H. Kirk, J.C. Frey, and R.D. Pasheck.
HIGHWAY DEVELOPMENT: COMMUNITY ATTITUDES AND ORGANIZATION. In: Consequences of Highway Improvement. Highway Research Record, no. 16. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963, pp. 44-59.

A research study by Pennsylvania State University measuring community attitudes towards highway improvements both before and following completion, at Monroeville, Blairsville, and four interchanges in the vicinity of York. Data are also presented on population changes and on changes in local-government functions arising out of the highway construction.

D-002

Davis, E.W.
PIGGYBACKING AND ITS INFLUENCE ON TOLL FACILITY COMMERCIAL TRAFFIC. Traffic Quarterly, vol. 17, October 1963, pp. 528-43.

Railroads have 5 basic piggyback plans, some totally railroad run and some, joint arrangements with truckers and shippers; these are described. Cooperation between trucking companies and railroads is discussed. The rate of growth for piggyback shipping is given in various tables. The Northeast accounted for 49.7% of the total piggyback loadings for 1962. Technological developments influencing piggyback transport are described, e.g. efforts to obtain a standard shipping container. Shipping automobiles by piggyback is promising and this application is explored. Piggybacking by air and ship is also discussed. The effect on rates, labor, taxes and tolls is described. Studies show that 95% of piggyback trips are for distances over 500 miles, and up to 20-30% savings can be realized by this method.

D-003

Day & Zimmerman, Inc.
REPORT TO THE ALTOONA AND LOGAN TOWNSHIP BUS AUTHORITY ON PRESENT AND PROPOSED BUS SERVICE IN THE CITY OF ALTOONA AND LOGAN TOWNSHIP. Day and Zimmerman, Inc. Philadelphia, Pa., 1966.

A consideration of the facilities, route locations, fare system, employee relations and nature, management, and trip origins and destinations of the existing Altoona and Logan Township Bus Authority. Recommendations of the Study include: consultations with city and township authorities to implement the study; with the union to discuss the route changes and modifications of contract; route changes; applications for State and Federal funds; and efforts to "sell" the bus service to the residents of Altoona, for the purpose of rationally handling long-standing deficits of the bus line.

D-004

Dean, Joel.
COST ANALYSIS FOR COMPETITIVE RAILROAD RATEMAKING. In: Issues in Transportation Economics. Karl M. Ruppenthal, ed. Charles E. Merrill Books, Inc., Columbus, Ohio, 1965, pp. 142-156.

It is stated that four factors have contributed to the freight traffic loss of the railroads to the truckers, namely: truckers are more efficient, railroads give poor service, railroads have faulty pricing, and there has been a decentralization

of economic activity. The discussion centers around faulty pricing (unrealistically high rates, rates higher for high-value commodities than for low-value commodities, lack of incentives for heavy loading, and excessive discounts for long hauls) and the role of cost analysis in pricing. An address given in 1959 to the Railroad Systems and Procedures Association.

D-005

Deem, Warren H. and J.S. Reed.
AIRPORT LAND NEEDS. Arthur D. Little, Inc., Cambridge, Mass., 1966.

A survey of airport land needs in 59 metropolitan areas on the consequences of suburbanization for airport development, financing airport development and land acquisition 1950-65, acquiring land, and airport land needs and costs in the next 10 years.

D-006

Delisi, Samuel P.
COORDINATED FREIGHT TRANSPORTATION SERVICE; LEGAL AND REGULATORY ASPECTS, Part II, ICC Practitioners Journal, May-June 1967, pp. 548-590.

D-007

de Weille, Jan.
QUANTIFICATION OF ROAD USER SAVINGS. International Bank for Reconstruction and Development. Johns Hopkins Press, Baltimore, Md., 1966. 93 pp.

The ultimate aim of this paper is to contribute to a better assessment of the economic significance of road investments. It should be added that the roads in question are primarily those of developing countries. The book deals only with road-user operating costs, savings, or benefits, and does not enter the field of general social and economic consequences of the road improvement in developing countries. The book covers the following six elements of vehicle operating costs: fuel consumption, engine oil consumption, tire wear, depreciation and interest, maintenance, and occupant's (or driver's) time. These cost items are correlated with vehicle speed and developed for three classes of passenger cars and four levels of weights of trucks. The author works out the motor vehicle operating cost on three classes of roadways: good pavement, a gravel surface, and an earth surface. These three surfaces are used as typical and from their costs an individual analyst could adjust the data for particular local conditions with reference to the quality of local roadway surfaces.

D-008

Dickins, J.H.
NEW SYSTEM DEVELOPED FOR TRAFFIC DATA ACQUISITION. Traffic Engineering, vol. 35, no. 3, Dec. 1964, pp. 12-15, 31.

The new techniques, instituted by the Port of New York Authority which utilize time sequenced, vertical aerial photography, permit gathering of simultaneous traffic statistics for extensive roadway networks and complex interchange systems. The system is reported to have greater scope than conventional ground survey methods, and provides permanent, photographic records of traffic operations for future reference or for deferred analysis.

D-009

Dixon, W.J.
TECHNOLOGICAL ASPECTS OF UNIT TRAIN OPERATION.
ASME-Paper 64-WA/RR-1 for meeting
Nov. 29-Dec. 4, 1964. 4 pp.

The concept of operation of unit trains, i.e., solid trains carrying a single commodity in substantial and continuous volume between specific points, is discussed.

D-010

Donnell, P.M.
BASIC INFORMATION NEEDED FOR SOUND CAPITAL INVESTMENT PLANNING.
In: Formulating Highway Construction Programs, Workshop Conference Proceedings, Sept. 19-20, 1960. Highway Research Board Special Report 62. National Research Council. National Academy of Sciences, Washington, D.C., 1961, pp.50-56.

Sound construction planning requires establishment of an inventory of the existing road plant, followed by establishment of condition ratings, road life and costs, traffic volumes on roads where these are variable, and construction of traffic flow maps. Planning for the future integrates the above information with standards for various types of roads and projections into the future. Application of tolerability standards determines need for repair or reconstruction. Integration of state highway plans with urban area transportation studies and plans is essential; the latter being based on projections of urban land use, growth, estimates of needed and available funds, and schedules of such needs and availabilities.

D-011

Douglas, Peter S.
NEW IDEAS IN RATEMAKING: MASS-PRODUCTION PRICING.
ICC Practitioners and Journal, May-June 1967, pp. 591-598.

D-012

Dyckman, J.W.
TRANSPORTATION IN CITIES. Scientific American, vol. 213, September 1965, pp. 162-74 .

General aspects of urban transportation problems are discussed. The theory that traffic is a function of land use is discussed. The role of transportation facilitie in forming a city is explored. The dispersive effect on city structure of higher income with its corollary increased use of the automobile, is examined. Mass transit today is unprofitable for owners and unattractive to users. The difficulties of transit systems are discussed. Plans for making mass transit more competitive with the automobile are explored. The San Francisco Bay Area Rapid Transit District is examined in detail. Efforts to accommodate increased automobile usage are also discussed.

E-001

Eckert, Edward C.
A CONCEPT FOR INTERSTATE SYSTEM REST AREAS. In: Roadside Development. Highway Research Record, no. 23. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963, pp. 42-46.

Rest areas should have toilet facilities that are easily accessible and close to the parking area. The well should conform to local health standards and should be easily reached. Telephones should be in keeping with the rule of least inconvenience. All buildings and grounds should be well lighted and the lights turned on and off by a photoelectric eye. Sidewalks should link the different facilities. Refuse barrels should be provided and plainly marked to encourage their use. Landscaping should provide a park-like atmosphere but no attempt should be made to hide the toilets. A survey has shown that 43% of the persons who stopped at rest areas used the toilet facilities first. The next most popular service was resting (23%), followed by drinking water (20%), picnicking (4%) and 9% used bulletin boards, trash cans or telephones. Maintenance must be of a high and continuous standard. Neglect breeds neglect and mis-use on the part of the public, with the final result of excessive vandalism and loss of respect. The first item of maintenance is that of the toilet facilities and the author discusses this problem in some detail. Periodic night visits by law enforcement officers may be necessary since these rest areas must be open 24 hours daily.

E-002

Edwards, Gordon.
PLANNING THE METROPOLITAN AIRPORT SYSTEM. Federal Aviation Agency, Washington, D.C., 1964, IR 8344 .

E-003

Edwards, L.K.
HIGH-SPEED TUBE TRANSPORTATION. Scientific American, vol. 213, Aug. 1965, pp. 30-40.

A pneumatic tube train originally proposed by Lockheed for use in the Northeast Corridor is described. The proposed train will travel at an average speed of 200 mph with cruising speeds over 400 mph. The system would have a peak capacity of 9,000 passengers/hr. A single train will make a round trip in about 4 hours. The trains can also carry express cargo. The tubes will be in a tunnel, would float in water, and trains will travel on steel wheels on steel rails. Technology of the above components of the system is discussed as well as car construction; the pneumatic propulsion system is described in detail. A modification of the system for urban mass transit is also described in some detail.

E-004

Enfield, F.D. and J.R. Tuggle.
NEW TECHNOLOGY FOR SST MAINTENANCE. ASME-Paper 65-AV-12 for meeting Mar. 14-18, 1965. 11 pp.

The factors influencing the profitability of commercial supersonic transport are examined and the need for reducing unscheduled flight line maintenance is identified. Several promising approaches are discussed and design criteria for airborne maintenance-analysis system are developed. The essential airborne elements of the system are: central processing and control unit (digital computer), remote sensor and/or conditioner units, indicator and multiplexer/converter units. An example shows how airborne maintenance-analysis equipment could help to provide increased utilization. Estimates are given for the development costs of the system and the cost of equipment per aircraft.

E-005

England, A.C.
BALANCING OF PHYSICAL AND ECONOMIC RATINGS WITH OTHER CONSIDERATIONS TO ESTABLISH PROJECT PRIORITIES. In: Formulating Highway Construction Programs, Workshop Conference Proceedings, Sept. 19-20, 1960. Highway Research Board Special Report 62. National Research Council. National Academy of Sciences, Washington, D.C., 1961, pp. 95-108.

In establishing project priorities legislative directives, maximum use of federal funds, coordination with other state's systems, must be considered. Economic analysis is used to determine the importance of the construction and a method of setting up sufficiency ratings on existing roads, as is done in New Mexico, is detailed with charts. (8 charts)

E-006

Evans, D.H., R. Herman and G.H. Weiss.
HIGHWAY MERGING AND QUEUING PROBLEM. Operations Research, vol. 12, no. 6, Nov.-Dec. 1964, pp. 832-57.

A study of several aspects of the theory of car queues, for a situation in which there is traffic on the main highway and a queue of cars on a side road waiting to merge, is described. Expressions for generating function of steady-state and waiting-time distribution are derived. The critical input to side road is determined such that for all larger inputs the queue is transient. The effect of move-up time on the queue is considered in particular. 20 refs.

E-007

Evans, H.K.
TRANSPORTATION PLANNING CRITERIA FOR NEW TOWNS. In: Planned Communities. Highway Research Record, no. 97. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 30-51.

The need for thorough traffic estimation and the synthesis of future travel patterns for new towns is emphasized. The economic-base study is one of the most important criteria affecting plans. This should be considered along with the initial investigations of the physical, legal, and financial features of new town development. These criteria determine the volume and pattern of traffic as well as the interchange between the new town and adjacent communities. There must be feedback be-

tween the preliminary findings of the transportation planners and the economic-base land-use planning team. The latter's projects and suggestions may then be modified to product acceptable transportation conditions. Illustrative maps, tables, and data are presented for two proposed developments in California. When preliminary plans were examined, impossible traffic densities were predicted and the proposed land-use densities and dispositions had to be changed. The author summarizes the steps in transportation planning: formulation of trial road networks, based on preliminary land-use plan, trip-generation estimates, estimate of interchange between new town and other communities and through traffic, trip distribution, trip assignment to alternate routes, evaluation and feedback as necessary, selection and staging of transportation plans.

F-001

Farrell, F.B.
HIGHLIGHTS AND SIDELIGHTS OF FEDERAL-AID HIGHWAY PROGRAM. SAE-Paper S426 (Central Illinois Sec.) for meeting Apr. 6-7, 1965. 6 pp.

A review of the United States' Interstate road program and of the scope, functions and role of the US Bureau of Public Roads. The partnership arrangement between the US Bureau of Public Roads and the state highway departments is described as the prime reason for success.

F-002

Fitch, L.C.
SUMMARY AND RECOMMENDATIONS. In: Urban Transportation and Public Policy. Chandler Publications, San Francisco, Calif. 1964, pp. 1-8.

The preponderance of urban transportation demand is for intra-urban travel, which differs from interurban travel in the purpose, length, frequency of trips, in routes, and in modes of transportation. Urban transportation has suffered from the lack of comprehensive planning coordinated with land-use-and-development. It should deal with transportation problems on an over-all integrated basis with private and public transportation on an equal footing. Mass transit was found to be more efficient in land use and less costly than the private automobile. It is recommended that direct federal assistance used to support specified transportation services or to stimulate improvement of capital facilities should go only to local or state governments. Specific recommendations for a federal program include: matching grants or loans to state or local public agencies for mass-transportation-improvement projects conforming to comprehensive regional plans; and an interim program of assistance for high-priority projects. The amount of federal assistance needed nationally for urban transportation over a 10-year period is estimated at $9.8 billion.

F-003

Fitch, L.C.
THE URBAN-TRANSPORTATION PROBLEM. In: Urban Transportation and Public Policy. Chandler Publications, San Francisco, Calif., 1964, pp. 9-24.

The most troublesome urban-transportation problem is meeting the peak demand of the journey-to-work in the largest metropolitan areas, with the recreation peak problem second. Current measures to relieve congestion will become increasingly inadequate. Deficiencies of mass-transportation operations are discomfort, inconvenience, low average speed, and obsolescence. Urban transportation has created unattractiveness of land use, as well as health hazards in air pollution. Fragmentation of planning and administration with short-comings in personnel and finance are among institutional deficiencies. Commuter railroads are the weakest elements, financially. Conceptual deficiencies include the paucity of research-and-development studies and unsettled issues of objectives of urban design and land-use planning, of comparative roles of modes of transportation, of optimum means of financing intra-urban transportation, and of objectives and techniques of planning.

F-004

Flaherty, Mark C.
COMMERCIAL HIGHWAY SERVICE DISTRICTS AND THE INTERSTATE. In: Indirect Effects of Highway Location and Improvements. Highway Research Record, no. 96. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 8-18.

A method is suggested by which local officials can better guide land-use development opportunities available as a result of Interstate highway construction. The commercial businesses which directly serve the road user are automotive service and highway-oriented retail and personal service. Protective regulatory standards to guide proper site development should be established specifically for these highway service districts. When considering locations for these districts the factors of interchange function and design, traffic conditions, user costs, and land-use environment should be appraised, and indices are suggested. Techniques and results from the West Duluth study are presented by way of illustration of the implementation of the above considerations. Prudent control of land use can only be accomplished by cooperative efforts of state and local authorities.

F-005

Fleischer, G.A.
EFFECT OF HIGHWAY IMPROVEMENT ON TRAVEL TIME OF COMMERCIAL VEHICLES; A TWENTY-FIVE-YEAR CASE STUDY. In: Highway Economics, Highway Research Record, no. 12. Highway Research Board. National Research Council. National Academy of Sciences, Washington D.C., 1963, pp. 19-47.

Studies of actual economic analyses of highway improvement expenditures and time savings indicate that decisions are frequently quite sensitive to the way in which analysts treat the value of time saved. This paper deals principally with the method of introducing such savings into the analysis with the aid of a numerical case study, examining in detail comparative data for two major sections of highway and a principal commercial user over a 25-year period. Evidence indicated that time does not become economically significant simply because it is released by highway improvement; there is a considerable gap between the point at which time is saved and that at which it can be utilized in an economic sense. This conclusion may imply a need for a re-examination of time-savings formulas.

F-006

French, A. and T.S. Dickerson, Jr.
TRAVEL BY MOTOR VEHICLES IN 1963, 1964, and 1965. Public Roads, vol. 34, February 1967, pp. 132-3.

Annual travel statistics are presented in tabular form for passenger and commercial vehicles. Motor-vehicle travel is presented for main and local rural roads, and urban roads. Data are given on vehicle registration, average travel per vehicle, motor-fuel consumption, and average travel per gallon of fuel consumed.

F-007

Friedlander, Gordon D.
RAILWAY VS. HIGHWAY - THE ZOOM OF THINGS TO COME. IEEE Spectrum, vol. 4, no. 9, Sept. 1967, pp. 62-76.

Cities which have applied the concept of balanced transportation to their systems are: Chicago, Toronto, Cleveland, and San Francisco, as well as the Northeast Corridor region. DOT's High-Speed Train Evaluation Project, (the train which is expected to reduce the time between New York and Washington to 2 hours and 18 minutes) is described. Innovations in transportation currently in the design or testing stages include the Budd Company's skylounge and skycrane, a monorail and capsule system, the gravity-vacuum tunnel, and tubeflight vehicles.

F-008

Fromm, Gary, ed.
TRANSPORTATION INVESTMENT AND ECONOMIC DEVELOPMENT. Transport Research Program. Brookings Institution, Washington, D.C., 1965.

F-009

Frye, F. F.
EFFECT OF AN EXPRESSWAY ON DISTRIBUTION OF TRAFFIC AND ACCIDENTS. In: Freeway Operation. Highway Research Record, no. 21. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963, pp. 90-105.

The building of the Congress Expressway in Chicago resulted in a 25% reduction in the number of accidents in the study area (which included the Expressway), despite an approximately 20% increase in weekday traffic. By comparison, a 14% increase in traffic in 3 control areas was accompanied by a 14% increase in the number of accidents.

F-010

Fulda, Carl H.
COMPETITION IN THE REGULATED INDUSTRIES: TRANSPORTATION. Little, Brown and Co., Boston, Mass., 1961.

Competition and regulation of interstate transportation, embracing railroads, motor and water carriers, airlines and freight forwarders, is discussed. Rate agreements in surface transportation, intermodal competition, common ownership of several modes of transportation, and the relationship between the courts and the administrative agencies are all presented.

G-001

Galbreath, R.V.
COMPUTER PROGRAM FOR LEVELING RESOURCE USAGE.
ASCE Proceedings, vol. 91, (J. Construction Divison), no. CO1, May 1965, paper 4327, pp. 107-24.

A computer program is presented that is to perform the task of leveling resource usage for a project using, as input, the critical path method solution for event times and floats. The manipulations of activities follow a predetermined order of selection. The order of selection is explained with both good and bad features noted. The control of an individual problem is provided to the user through the ability to vary several inputs. The program is designed to accept superposition of additional criteria for manipulation.

G-002

Garcia, Danilo M., and J.H. Jones.
HIGH DENSITY VEHICULAR FLOW-DENSITY RELATIONSHIPS. ASCE Proceedings, vol. 91, (J. of the Highway Division), no. HW2, Dec. 1965, paper 4581, pp. 37-49.

Assuming some continuous functions to connect limiting values of speed and density, diagrams of the speed-density, flow-density, and flow-speed relationships can be postulated. The asymptotes denote the extreme conditions of an empty roadway and a traffic-jammed roadway. Much of the work related to road traffic flow has been based on car-following theories, which may be classified as individual car-following or macroscopic car-following. Two models have been used extensively: Greenshield's model plotted speed against density for single-lane traffic and fitted a straight line to the points. Greenberg's model is based on assumptions of continuity and the equation of motion for an inviscid, compressible fluid. In applying these models in an experiment, it was found that for conditions of macroscopic car-following, the flow-density-speed relationships may be described by either model, with no conclusive evidence indicating a discontinuity in the flow-density curve.

G-003

Gardner, E. H.
THE CONGESTION APPROACH TO RATIONAL PROGRAMMING. In: Highway Needs and Programming Priorities. Highway Research Board Bulletin 249. National Research Council. National Academy of Sciences, Washington, D.C., 1960. pp. 1-23.

A proposed priorities rating formula for highway evaluation for the Commonwealth of Pennsylvania is described. The formula is suitable for electronic data processing. Tables and graphs show road life expectancy for various types of roads, urban street capacities, traffic volume, intersection capacities, travel time and other data.

G-004

Garrison, W.L., E.N. Thomas, and R.D. Warrall.
DATA SYSTEMS REQUIREMENTS OF URBAN AND REGIONAL POLICY MODELS. Research Report, Transportation Center, Northwestern University, Northwestern University, Evanston, Illinois, Oct. 1966. 44 pp.

This paper concentrates on three interrelated topics. First, a review and critique is presented of the adequacy of those data systems on which the main modeling efforts at the present time are based. Certain desirable properties of models are discussed. The final section contains statements of data systems requirements. The paper contains a mixture of reviews of the state-of-the-art of modeling and of data systems, of recommendations and of programs of development. Such a mixture necessarily contains elements of opinion, judgment, and synthesis; therefore, to establish the point of view, references to the literature are used to document the statements wherever possible.

G-005

Gazis, Denos C.
MATHEMATIC THEORY OF AUTOMOBILE TRAFFIC. Science, vol. 157, no. 3786, July 21, 1967, pp. 273-281.

A review of mathematical traffic flow models including the following: car-following models, the problem of pedestrian crossing and other conflicts in traffic, synchronization of traffic control, and traffic assignment. 80 references.

G-006

George, Stephen Jr. and C.E. Pyers.
APPLICATION OF CRITICAL PATH PROGRAMMING TO LARGE-SCALE TRANSPORTATION STUDIES. In: Highway Research News, no. 12. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., June 1964, pp. 51-65.

The use of a managerial tool, critical path programming, has been applied to large-scale urban transportation planning programs. The method is based on the premise that if any single object or activity in a chain of projects or events can be referenced to other activities that must precede or follow it, if activities that can be in operation simultaneously can be identified, if an estimate of manpower for each activity can be assigned, the path of critical flow that identifies the controlling activities can be analyzed and rescheduled to minimize time, effort, and cost. The application of this Critical Path Method to the Puget Sound Regional Transportation Study is described. Although it may be applied to countless fields, it must be emphasized that the method is only as good as the input available. The historical data regarding the breakdown of a transportation study into activity or job costs and duration time of a job need improvement. When transportation studies can be separated into individual activities as cleanly as in a construction project, the use of the critical path analysis will become even more valuable. It is particularly valuable during the planning and study design phase.

G-007

Gerlough, D.L. and F.A. Wagner.
IMPROVED CRITERIA FOR TRAFFIC SIGNALS AT INDIVIDUAL INTERSECTIONS: INTERIM REPORT. National Cooperative Highway Research Program Report 3. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964.

After a review of the literature, a computer simulation model was employed to handle all of the important factors in traffic performance at isolated intersections. Various portions of the preliminary model were tested separately and in combination with other portions and compared with empirical facts and the model was then modified and refined. The resulting model is described as considering a mixture of vehicle types and velocities; as sufficiently detailed to permit measurement of a full range of traffic characteristics; and as characterized by flexibility by which many alternative control schemes may be submitted for testing and evaluation. Contains a comprehensive 282-entry Bibliography; with 29 entries being given individual abstracts.

G-008

Gern, R.C. and H.R. Joyner.
CROSSROUTE ACCESS DESIGN IN INTERCHANGE AREAS. In: Freeway Operations. Highway Research Record, no. 59. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964, pp. 1-8.

The design factors which influence extension of access control for a certain distance along a crossroute are analyzed. Approximately 60 of the most common and important design situations were studied in detail. For each of these situations the controlling design elements, and combined into equations. The equations can be solved to give proper spacing between ramp terminals and access points along a crossroute. Their application in highway design is shown through the use of illustrative design problems.

G-009

Gervais, E.F.
OPTIMIZATION OF FREEWAY TRAFFIC BY RAMP CONTROL. In: Freeway Operations. Highway Research Record, no. 59. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964, pp. 104-118.

A study was carried out, at nine entrance ramps in a 3-mi study area on the John C. Lodge Freeway, Detroit, Michigan, to develop a freeway variable traffic control system with ramp entrance control, permitting opening or closing of the ramp. Each of the entrance ramps was placed under the control of a ramp signal bearing the message "Don't Enter". The signal is a blankout type device that shows the message only when it is illuminated. A review of the week's study shows that great gain in freedom of traffic flow is possible by use of the ramp closure system.

G-010

Gilbert, J.
POTENTIAL FOR INTERNATIONAL COMMERCIAL AIR SHIPMENTS.
SAE - 2nd International Forum for Air Cargo. Proceedings May 26-28, 1963, pp. B1-11.

This paper defines the scope and dimension of the cargo market. The basic information is derived from official United States Government data which provide complete coverage of the market. The subject is analyzed by air gateway, route, commodity, tonnage and value. Air shipments are compared to the total traffic moving in various markets by all modes of transport. Aggregative technique is used for discussing alternative trend lines for forecasting gross tonnage and their impact upon the international air cargo industry.

G-011

Gillilland, Whitney.
CAB CO-ORDINATION OF UNLIKE MODES OF TRANSPORTATION. Public Utilities Fortnightly, vol. 76, Sept. 2, 1965, pp. 15-28.

The basic premise of the CAB had been to keep the various modes of transportation separate and distinct to encourage competition. Gradually this philosophy has changed to provide for greater co-ordination between modes. In the Transportation Message of April 5, 1962, President Kennedy recommended that Congress declare that through routes and joint rates be vigorously encouraged, and authorized all transportation agencies to participate in joint board. He emphasized the need for co-ordination of policies and requested that the chairmen of the CAB, the ICC, and the Federal Maritime Commission meet frequently to discuss regulatory problems and seek co-ordinated solutions. A number of legal and administrative decisions are reported to illustrate the thesis of the article.

G-012

Granum, James O. and C. H. Burnes.
ADVANCE PROGRAMMING METHODS FOR STATE HIGHWAY STYSTEMS.
In: Highway Needs and Programming Priorities. Highway Research Board Bulletin 249. National Research Council. National Academy of Sciences, Washington, D.C., 1960, pp. 23-51.

An examination of the decision-making processes involved in selecting highway improvement projects in certain states and in a Canadian province is reported in this paper. It is concluded that eight major factors that must be present for most effective programming of work are: legislative support; executive action; factual survey; budget decision; systematic priority analysis; systematic coordination; scheduling and control; and administrative organization. These are briefly described and illustrated by example. Adequate advance programming requires firm and stable policies, well understood by the staff, and full implementation of the entire "package" of those eight factors.

G-013

Greenwood, George Watkins.
TRAFFIC LINKAGE PATTERNS BETWEEN A METROPOLITAN AREA AND THE COMMUNITIES WITHIN ITS REGION OF INFLUENCE. Engineering Publication Office. University of Illinois, Urbana, Ill., 1966.

G-014

Griffiths, Leon.
THE ELECTRIC CAR. Automobile Engineer, vol. 57, no. 9, Aug. 1967, pp. 329-340.

The electric car with all rotary drive, continuously progressive speed control, instantaneous starting, and silent, smooth, fumeless operation is described. Even though the cost of this vehicle is much greater than a comparable gasoline-powered vehicle, the substantially lower operating costs together with the small servicing requirements mean at least 25 percent less overall cost. It is eminently suitable for local delivery service. Even with its range limitation it would find a market as a city and suburban car. The advances in electric batteries are reported along with performance statistics. Electric vehicles now in operation are described with illustrations.

G-015

Guandolo, John.
TRANSPORTATION LAW. W. C. Brown Co., Dubuque, Iowa, 1965.

The interpretations and applications of the Interstate Commerce Act, the Federal Aviation Act, and related acts, together with decisions of the ICC, CAB, Federal Maritime Commission, and the courts have been analyzed; the principles of law arising from them have been discussed in terms of interpretation and application by administrative bodies and courts. The material is organized into 55 chapters, basically in the form of treatments by subject heading. There is no discussion of state law or state administrative or regulatory agencies as such; but the question of Federal vs. state jurisdictions is covered.

G-016

Gunston, W.T.
RAILWAYS OF THE FUTURE. Science Journal, vol. 3, no. 8, Aug. 1967, pp. 34-45.

A discussion of what can be done to improve existing railways and consideration of the optimum form of high speed ground transport. Aerospace techniques have improved understanding of vehicle stability power. Future passenger vehicles will be designed unconventionally but, except for special cases, they will run on tracks. The ratio of power to weight must be raised to several times its present level for high speed, hence efforts have been made to reduce train weight. Wheel adhesion is a central factor affecting the performance of a railway, and efforts to influence it are reported. The only form of motive power for the required power/weight ratio on unimproved and non-electrified track is the gas turbine. The importance of aerodynamic design at higher speeds is stressed. The turbine motor train, part of the Northeast Corridor transport program, will cost about 30% less per mile to run than a conventional train of the same capacity on the same route. Possible schemes of improved communications are analyzed. Complete computer modeling of an entire railway is recommended as a technique. The major variables in any high speed ground transport

are the vehicle size, scheduling policy, method of propulsion, type of guideway and control system. Non-wheeled systems are discussed. Maximum operating speeds are presented for a number of high-speed ground transportation developments.

H-001

Haar, C.M.
TRANSIT AND THE GHETTO. Nation's Cities, vol. 5, no. 1, Jan. 1967, pp. 7-9.

The activities of HUD, through the Urban Mass Transportation Act of 1964 which awarded grants for the provision of transportation to low income groups in urban areas, are reviewed. HUD is using its transportation programs as part of a self-help policy to overcome the disadvantages of ghetto living so that ghetto dwellers may take advantage of available employment, cultural and health services, shopping and recreation facilities. HUD approved a $2.7 million research project in Watts to study the relationship between a public transportation system and job-and other opportunities of low-income groups. A $482,000 demonstration project grant to Nashville proposes to test the effectiveness of express bus service in meeting the transportation needs of low-income outpatients and hospital employees. Other projects are described.

H-002

Haar, Charles M.
URBAN TRANSPORTATION RESEARCH. Civil Engineering, vol. 37, no. 9, Sept. 1967, p. 64.

The author, Assistant Secretary for Metropolitan Development, U.S. Department of Housing and Urban Development, describes the eight contracts awarded in July 1967, designed to obtain solutions which may be developed in 6 months to 3 years, in 3 to 8 years, and in 5 to 15 years in the following areas: a comprehensive systems analysis, computer based, of urban transportation problems and their solutions; also certain specific elements such as a bi-modal small vehicle capable of traveling on both ordinary streets and high-speed automated guideways, electronic command and control systems, and methods of introducing innovations without neighborhood disruption. The institutions receiving the contracts are named and the scope briefly described.

H-003

Habeck, W.J. and R.F. McNamara.
ECONOMICS OF SLURRY PIPELINES. Iron and Steel Engineer, vol. 40, August 1963, pp. 137-41.

Pipelines can be used to transport almost any solid material if we neglect economics and if three conditions are met: the solids must not undergo any undesirable change as a result of the mixing or of the separation of the solids and liquid, or in the actual process of transportation itself; the slurry should not vary widely in viscosity; and the particle size should not be too large. The hazards of trying to use unit costs are shown by means of examples. Recent economic studies of the capital and operating costs for slurry transportation are tabulated, slurry line sizes, lengths, annual tonnages, construction costs, and operating cost per ton mile are all investigated in tables reflecting 1963 price levels. Slurry preparation, pumping stations, transmission lines, dewatering and drying, and over-all economics are discussed.

H-004

Haight, Frank A.
MATHEMATICAL THEORIES OF TRAFFIC FLOW. Academic Press, New York, N.Y., 1963.

Traffic flow is discussed from the following aspects: probability and statistics, theory of queues, fundamental characteristics of road traffic, arrangement of cars on a road, the simple delay problem, a two lane road, and miscellaneous problems.

H-005

Hamburg, John R. et al.
LINEAR PROGRAMMING TEST OF JOURNEY-TO-WORK MINIMIZATION. In: Urban Transportation Planning: Techniques and Concepts. Highway Research Record, no. 102. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 67-75.

Sensitivity to travel time is measured by an "index of indifference" which endeavors to measure the extent to which linkages among urban space activities are indifferent to time. The data used were from the Niagara Frontier Transportation Study and the analysis showed that people are really not indifferent to time. They do not, however, organize their linkages to expend the minimum amount of time on travel, although they do show more minimization than indifference. When the data were stratified by income class, it was observed that those in the highest class tended to be indifferent to travel time as measured by the index. Both the middle- and low-income groups tended to be more sensitive to travel time. When the data were stratified by race and by auto availability, the results were inconclusive. The authors point out that the index may be used in the study of other types of activity: retailing and recreation areas, or school-home, for example.

H-006

Hamilton, Calvin S.
THE DEVELOPMENT OF A LAND-USE DATA BANK FOR TRANSPORTATION PLANNING. In: Top Issues in Urban Research 1963. Highway Research Record, no. 64. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963, pp. 84-99.

The different levels of data collection necessary for transportation planning are discussed. The land-use and other data programs used for identifying the relationship between the types of detailed data and resulting information needed for planning transportation facilities by the Pittsburgh Department of City Planning are described. One of the biggest problems was managing the wealth of data for different geographic areas with overlapping boundaries; it was solved by the concept of a "data block" which roughly corresponds to a city block. The use of simulation and the type of outputs it will produce is described for the Pittsburgh Community Renewal Program. Appendices provide a summary of the likely results of the Community Renewal Program and a description of an information system.

H-007

Hamshaw, Thomas C.J.
STEPS TOWARDS LOWER OPERATING COSTS WITH CONVENTIONAL JET TRANSPORTS. J. Royal Aeronautical Society, vol. 69, no. 659, November 1965, pp. 737-743.

A paper read at a symposium on Cheap Short-Range Air Transport. The future of both the manufacturer and of the operator depends on ever lower fares. This paper notes some of the difficulties seen from the manufacturer's side. No answers are proposed, but it raises some important issues, particularly those commonly taken for granted: for example, who pays for what?, aircraft first prices, labor costs, production runs, longer airframe lives, improved reliability, a typical revolutionary change--the very large aircraft. Data on prices productivity and utilization show no advantage in bigger or faster aircraft--in fact the reverse; and that it almost always pays to buy a secondhand aircraft. The aircraft manufacturer faced with such analysis is forced into long range supersonic aircraft production for revenue rather than traffic reasons, is receptive to evolutionary rather than revolutionary ideas; and must also favor international coqperation to realize the full potential of his products. The next generation of aircraft will require all our skills to keep costs below today's.

H-008

Hand, I. and C.D. Hixon.
PLANNING TRAFFIC AND TRANSPORTATION IN METROPOLITAN AREAS. Traffic Quarterly, vol. 17, April 1963, pp. 254-73.

Various Federal bills, reports, and presidential messages are quoted to emphasize the crucial role of transportation in urban planning. Transportation planning must be comprehensive and must be done in close coordination with other aspects of urban planning. Community and transportation planning in Nashville and Davidson County, Tennessee, is described in detail. The proposed tasks of the Nashville Metropolitan Transportation Study are described. The study, if established as a continuing responsibility as is now proposed, will analyze planning and traffic data, feed back transportation needs to traffic and highway engineers, transit companies, planners and others, and formulate policy. Other proposals for the Nashville study are that it continue as a division of an existing department, be established as a new department, or be organized as an advisory body. Findings and recommendations of the Hershey Conference on Freeways in the Urban Setting are included. An appendix lists manuals prepared by the National Committee on Urban Transportation.

H-009

Haney, D.G.
USE OF TWO CONCEPTS OF THE VALUE OF TIME. In: Highway Economics, Highway Research Record, no. 12. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963, pp. 1-18.

The value of time, the factor used in converting the savings in travel time for the occupants of passenger cars, is used in examining the meaning and the importance of the willingness-to-pay concept. The use of the cost of time concept to make better decisions in analyzing alternative highway designs and locations is demonstrated. The factors used are: annual highway cost, annual user cost, and annual travel time for passenger cars. The effect that the value of time has on benefit-cost ratios is shown. Factors of error are provided. The Cost of Time Procedure is compared

with the Benefit-Cost Ratio Procedure. Because little is known about the actual willingness to pay, little confidence can be placed in converting travel time savings in hours to dollar values. The most immediately practical use of the Cost of Time procedure would be to estimate the maximum allowable cost of time, using data on last year's proposals and budgets.

H-010

Haning, Charles R. and C.V. Wootan.
VALUE OF COMMERCIAL MOTOR VEHICLE TIME SAVED. In: Freight Transportation. Highway Research Record, no. 82. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 54-76.

An attempt to determine the dollar value of time savings to commercial vehicle operators, in intercity and over-the-road operation, resulting from the use of improved highway facilities. Following a discussion of alternative approaches, the authors decided upon the net operating profit approach as the most appropriate. A detailed description of the methodology, data, equations and results are given. A consideration of the market area approach is also presented in which the value of time savings for a private commercial fleet is expressed mathematically, taking into account the utilization of time savings to effect operating cost economies while expanding the market area. This report is based on a study done for the Bureau of Public Roads. 15 references.

H-011

Hansen, H.W.
GUIDES FOR TRANSPORTATION PLANNING. Traffic Quarterly, vol. 16, April 1962, pp. 201-11.

A nationwide comprehensive transport study is proposed which would provide information on intercity movements of people and goods by all forms of transportation. Guidelines for this study are presented. Included are discussions of population and city growth, and urban travel patterns. Existing transportation studies are piecemeal and must be coordinated. General procedures for the national study are presented and discussed. It is primarily the trips having their origin and destinations in larger cities which establish the locations of major intercity travel corridors.

H-012

Harbaugh, K.H. and W.H.G. Fitzgerald.
HYDROFOIL OPERATIONS AND DEVELOPMENT EXPERIENCE 1952-1964. Society of Naval Architects & Marine Engineers - Hydrofoil Symposium - Paper 2-h for meeting May 13-14, 1965. 11 pp.

The utility of a hydrofoil vessel, at marine speeds from 25 to 100 knots, for both military and commercial operations, is illustrated on the basis of data accumulated over 12 years from the operation of some 79 vessels designed by Supramar, using Schertel-Sachsenberg foil systems. A number of long, open sea cruises of these vessels are described. A few incidents involving collisions of hydrofoil vessels with various objects are included. The problems of maintenance and design modifications brought about by corrosion and erosion due to cavitation are indicated.

H-013

Harper, B.C.S. and H.M. Edwards.
GENERATION OF PERSON TRIPS BY AREAS WITHIN THE CENTRAL BUSINESS DISTRICT. In: Traffic Origin and Destination Studies; Appraisal of Methods. Highway Research Board Bulletin 253. National Research Council. National Academy of Sciences, Washington, D.C., 1960, pp. 44-61.

City planners state that the traffic which flows in and out of a city each day is generated by the buildings in the center. To verify this hypothesis, and to see if floor-space forecasts could be used to predict travel to the central business district, a study was made of floor space in use and travel to the central business district. Floor space in use in each destination zone was classified in three broad categories of retail, service (office and manufacturing), and warehousing. These figures were then considered as variables causing the difference in the number of persons shown by the origin-and destination survey to have a destination in the various zones. A statistical regression technique was used to determine any relationship between the variables. The relationship between floor space usage and the number of persons with destinations within a zone was found to be well developed. The mathematical relationship determined by regression analysis predicted the person destinations with less than 20% error. In zones of high attraction the error was within 2%. This was repeated in all the seven cities studied and the truth of the hypothesis seemed demonstrated. The extent of the error could probably be reduced by considering a larger number of floor-space variables or modifying the mathematical law slightly. The cities studied were metropolitan areas with populations of more than 250,000: Philadelphia, Detroit, Baltimore, Seattle, Vancouver, Tacoma, and Dallas. Great similarities existed among Philadelphia, Detroit, Baltimore, and Seattle. Tacoma seems to represent another group although the data available were limited and thus inconclusive.

H-014

Hassall, A.F.A.
HOVERCRAFT IN UNITED KINGDOM - REVIEW OF SIGNIFICANT EVENTS IN 1964 AND SOME LIKELY DEVELOPMENTS IN NEAR FUTURE.
SAE-Paper 650220 for meeting Apr. 12-15, 1965. 5 pp.

In June, 1964, Westland Aircraft Ltd. ran trials on the SR-N5 vehicle. Specifications are given for the SR-N4 and SR-N5 vehicles. The vehicles most likely to be used on the proposed commercial ferry operation across the Solent estuary between the mainland and the Isle of Wight are the SR-N4 or VA-4. Future development plans concern a land version of Hovercraft running on track, for rapid, intercity transport. Possible configurations of the vehicle and a proposed means of propelling it by the linear induction motor are discussed. Study of the economic estimates for a 150-seat, diesel powered, tracked Hovercraft are given.

H-015

Hatry, Harry P. and J. F. Cotton.
PROGRAM PLANNING FOR STATE, COUNTY, CITY. State-Local Finances Project, George Washington University, Washington, D.C., January, 1967. 72 pp.

In recent years a substantial movement has emerged which gives some promise of more rational decision-making in government programs. Since the early 1960's the Department of Defense has been experimenting with planning techniques designed to improve the effectiveness of programs in pursuit of the Department's missions. In the fall of 1965 the President directed most federal departments and agencies to apply the same system of Planning-Programming-Budgeting (PPB) to their programs. States and localities are turning to an exploration of the feasibility of PPB at state and community levels. In the light of this interest, the present monograph was prepared. Part One describes a programming, planning, budgeting system. Part Two presents the logic program evaluation. Its mathematical formulation is not meant to propose formulas that could directly be used for computing the best possible programs and program combinations. It rather is designed to present the mental processes through which the analyst has to go in order to provide to the decision-makers relevant information in quantifiable form.

H-016

Hawkins, W.M.
NEXT 50 YEARS IN AVIATION. Astronautics & Aeronautics, vol. 3, no. 7, July 1965, pp. 90-9.

An attempt is made to appraise the economic and technological environment to be expected with respect to aviation. Growth areas for short-range aviation, and domestic and international travel are estimated and possible aircraft configurations ranging over VTOL, SST, 500-passenger and semiballistic aircraft are projected.

H-017

Heanue, K.E. and C.E. Pyers.
A COMPARATIVE EVALUATION OF TRIP DISTRIBUTION PROCEDURES. Public Roads, vol. 34, no. 2, June 1966, pp. 43-51.

The results of a research project designed to test, evaluate, and compare four major trip distribution techniques are presented. These techniques are the Fratar growth factor procedure; the gravity model; the intervening opportunities model developed by Morton Schneider of the Chicago Area Transportation Study; and the competing opportunities model suggested by Anthony Tomazinis of the Penn-Jersey Transportation Study. An attempt has been made to give the potential user of trip distribution models insight into the theoretical differences underlying them as well as knowledge of their advantages and disadvantages in a practical application. The validity of these models as forecasting tools is also presented.

H-018

Heathington, Kenneth W. and P.R. Tutt.
TRAFFIC VOLUME ANALYSIS OF URBAN FREEWAYS. Departmental Research Report no. SS 5. 0, App. 1, Texas Highway Department (Austin, Texas 78701) Sept. 1966. 106 pp.

To design and to evaluate the traffic movement on any section of freeway, highway, or arterial street, it is necessary to determine a traffic volume for a number of specific periods of time. In 1963, traffic volumes in 5-min. intervals were manually recorded at nineteen urban locations in six Texas cities. In 1965, traffic volumes in 5-min. intervals were recorded with traffic actuated equipment at fifteen urban locations in six Texas cities. From the 1963 and 1965 data, a method to predict the peak-hour volume in the inbound direction from the 24-hr. traffic volume has been developed. The distribution, by lane, of the directional volumes for each 5-min. interval, is graphically displayed. The results of the analysis of the 1965 data generally show good correlation with the development of expansion factors for the locations under study. It is evident from the data that traffic counts of short duration can be used to estimate the traffic volumes for longer-time intervals, the resulting volumes being well within the limits necessary for design purposes.

H-019

Heinemann, E.H.
AVIATION IN PERSPECTIVE. J. Royal Aeronautical Society , vol. 69, no. 650, Feb. 1965, pp. 85-95.

Past progress is examined to establish a base for projections into the future. Aircraft are classified as VTOL-STOL, conventional propeller-driven, subsonic and supersonic jets, and development possibilities for each group are indicated. Aircraft under development and construction in various divisions of the General Dynamics Corporation are described to demonstrate aircraft types required across complete spectrum of performance. Models are either under prototype development, production, or modification. A possible arrangement is shown of a suborbiting craft employing suborbiting or momentum principles.

H-020

Hemmens, George C.
THE STRUCTURE OF URBAN ACTIVITY LINKAGE. Center for Urban and Regional Studies. Institute for Research in Social Science, University of North Carolina, Chapel Hill, N.C., 1966.

H-021

Hewitt, Otha.
COST ANALYSIS OF METHODS FOR INTERSTATE GUIDE SIGN MAINTENANCE. In: Highway Research News, no. 21. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., Nov. 1965, pp. 48-58.

Interstate guide signs measuring 10 to 15 feet high and 15 to 20 feet long are not uncommon. Their maintenance is the responsibility of state highway departments. Two methods have been compared: the conventional method in which the panels are chemically stripped and reused, and an overlay method employing new techniques designed specifically for the large signs of the Interstate System. The steps in the conventional method are given in detail, as are those for the overlay method. There are illustrat-

ions of the work. It was found that the conventional method cost from 18-40% more than the overlay method, depending on the wage scale and the original backing used. The overlay method required only 58% of the time required for the conventional method and was done without stripping, degreasing and etching tanks. Where there has been substantial damage (bullet holes, rock dents) the overlay method does not require panel replacement while the conventional method does.

H-022

Hiatt, M.A. and K.C. Plewes.
CONVERTIBLE PLANE TO CARRY PEOPLE BY DAY, CARGO BY NIGHT.
SAE Journal, vol. 74, July 1966, pp. 58-9.

H-023

Highway Research Board.
ADMINISTRATIVE STRUCTURE OF LOCAL RURAL ROAD ORGANIZATIONS.
Highway Research Board Special Report 37. National Research Council. National Academy of Sciences, Washington, D.C., 1958, pp. 29-30.

Information on the administrative structure of such bodies in Pennsylvania is reproduced in the table below and on page 75.

Pennsylvania

1. Unit:

   County
   Second class township
   Other local governmental units in Pennsylvania are considered as urban.

2. Policy-making board:

   Board of county commissioners
   Board of township supervisors

3. Number of members on board:

   Board of county commissioners - three
   Board of township supervisors - three

4. How members are selected:

   Board of county commissioners - elected at large by the qualified electors of the county.
   Board of township supervisors - elected at large by the qualified electors of the township.

5. Term of office:

   Board of county commissioners - four years
   Board of township supervisors - six years, staggered, one member being elected every two years.

6. Manager and method of selection: The rural road function in Pennsylvania is principally an obligation of the second class townships. Boards of county commissioners, in some counties, con-

trol roads designated county roads, and may appoint a county road caretaker to inspect and repair such roads. Boards of county commissioners may appoint, to serve at their pleasure, a professional civil engineer to be titled county engineer, to prepare plans, specifications and estimates of all engineering work undertaken by the county.

The board of township supervisors is required to divide the township into one or more road districts, and to employ a superintendent for the entire township or a roadmaster for each district. This requirement does not prohibit the township supervisors from being employed as superintendents or roadmasters, or as laborers. Two or more townships may appoint the same person as superintendent.

The board of township supervisors may, at any time, appoint a township engineer who shall be a registered professional engineer to perform such duties as prescribed as to the construction, reconstruction, maintenance, and repair of all streets, roads, pavements, sewers, bridges, culverts and other engineering work.

7. Division of duties and responsibilities: Boards of county commissioners may locate, construct, reconstruct, widen, replace, remove and in all respects provide for bridges and viaducts and the approaches thereto, over streams and other impediments to public traffic, except such structures belonging to cities, boroughs, and the state highway system.

Boards of county commissioners, may upon approval by the Court of Quarter Sessions, originally lay out and open roads, take possession of, and exercise control over, any existing township road or part thereof, and build and maintain roads as county roads within their respective limits. Bridges, other structures, and roads thus constructed by the board of county commissioners, or subject to their control, must be maintained by the county or the county must make arrangements with local political subdivisions to do the maintenance work.

The board of township supervisors, or the supervisors acting as superintendents or roadmasters, are charged with the general care and superintendence of the improvement of roads and bridges in the township. The duties and authority of appointed superintendents are regulated by the appointing officials at whose pleasure they serve.

H-024

Highway Research Board.
AUTOMOBILE PARKING: SELECTED REFERENCES, 1962-1964. Highway Research Board Bibliography 37. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

380 Annotated entries on all facets of parking. Includes author, subject and geographical indexes.

H-025

Highway Research Board.
COMPONENT ELEMENTS OF THE PLANNING PROCESS. Highway Research Record, no. 137. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966.

H-026

Highway Research Board.
CONSEQUENCES OF HIGHWAY IMPROVEMENT. Highway Research Record, no. 16. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963.

Five reports on: the economic impact of secondary road developments, the relation of highway accessibility to urban real estate values, area development and highway transportation, parkways, values and development in the Washington metropolitan region, and highway development in relation to community attitudes and organization.

H-027

Highway Research Board.
ECONOMIC FORECASTING. Highway Research Record, no. 106. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966.

Six papers dealing with transportation problems of urban areas. Two of the papers deal with highway incomes, expenditures, and user-taxes; and with residential location and urban mobility. The remaining four have been abstracted and appear in the Bibliography under B-027, B-029, K-001, and S-039.

H-028

Highway Research Board.
EFFECT OF CONTROL DEVICES ON TRAFFIC OPERATIONS; INTERIM REPORT. National Cooperative Highway Research Program Report II. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964.

Describes the parameters employed in studies in the Chicago area to determine the effects of stop- and yield-sign installations. They include speed, volume, gap and lag acceptance, travel time and delay, safety, headway distribution, route choice, and driver actions. The paper is divided into two parts: individual and adjacent inter-

section operation; and operation along a traffic corridor. The evaluation of the parameters for individual intersections, the measurable effects from control on adjacent intersections, and travel route pattern changes that developed from the new installation or change in type of traffic control device are discussed. Traffic simulation on electronic computers is reviewed.

H-029

Highway Research Board.
ENGINEERING ECONOMY 1963. Highway Research Board, no. 77. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

The first paper emphasizes the need for up-to-date studies of running costs for the use of highway engineering economy studies. Detailed discussion of fuel consumption, tire tread wear, engine oil consumption, maintenance and repair, and depreciation as related to vehicle design and speed changes as well as to highway design factors. Specific data are given for a passenger car and for a diesel semi-trailer. The other papers have been abstracted, and appear in the bibliography under C-028, M-038, and R-008.

H-030

Highway Research Board.
FORMULATING HIGHWAY CONSTRUCTION PROGRAMS. Workshop Conference Proceedings, Sept. 19-20, 1960. Highway Research Board Special Report 62. National Research Council. National Academy of Sciences, Washington, D.C., 1961.

After a discussion of the general problems in formulating highway construction programs, there are papers on specific aspects of investment planning (scheduling capital improvements; the legislative role, information needed for planning, accounting and budgets; priority analyses and project selection; scheduling of specific projects; law, administration, and public relations) and a summary and case study. Included are a glossary and a bibliography. Of the 16 papers 5 have been abstracted and appear in the bibliography under B-001, C-003, D-010, E-005, and H-098.

H-031

Highway Research Board.
FREEWAY CHARACTERISTICS, OPERATIONS AND ACCIDENTS. Highway Research Record, no. 99. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

The eleven papers presented are concerned with the traffic characteristics and the operational aspects of freeways. Traffic volume and capacity, mathematical traffic flow theory, traffic capacity and characteristics for on-ramp and off-ramp operation, and planning peak period surveillance and control on freeways are among the topics discussed. One of the papers has been abstracted and appears in the Bibliography under W-008.

H-032

Highway Research Board.
FREEWAY OPERATIONS. Highway Research Board Bulletin 324. National Research Council. National Academy of Sciences, Washington, D.C., 1962.

Five papers are presented: predicting the effectiveness of highway signs; the Squirrel Hill Tunnel (Pittsburgh) traffic operations study; an operational study of signalized diamond interchanges (Fort Worth); the collection and processing of traffic flow data by machine methods; and some fundamental relationships of traffic flow on a freeway.

H-033

Highway Research Board.
FREEWAY OPERATIONS. Highway Research Record, no. 21. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963.

The technology of freeway operation is discussed with special reference to left-hand exits, traffic behavior and off-ramp design, the influence of on-ramp spacing on traffic flow, the pilot detection system of the Congress Street Expressway, traffic surveillance and control, and the effect of an expressway (Northwest in Chicago) on alternate arterial streets. One of the papers has been abstracted and will be found in this bibliography under F-009.

H-034

Highway Research Board.
FREIGHT TRANSPORTATION. Highway Research Record, no. 82. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

Contains nine reports on statistics on waterborne commerce; trucking data from the 1963 Census of Transportation; highway ton-mile data; obtaining quality data from carload waybills and other samples. Five reports have been abstracted and appear separately in the Bibliography under H-010, H-102, K-003, M-006, and N-016.

H-035

Highway Research Board.
FREIGHT TRANSPORTATION ECONOMICS. Highway Research Record, no. 175. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967. 32 pp.

Four papers on freight transportation economics dealing with information derived from census material on freight shipments and patterns, the methodology and information from the Southwestern Regional Continuous Traffic Study, and an analysis of the importance of transportation in the overall economy. Two of the papers have been abstracted and appear in this bibliography under C-014 and R-003.

H-036

Highway Research Board.
FRONTIERS OF RESEARCH IN HIGHWAY LAW, 1963-1964. Highway Research Record, no. 78. Highway Research Board. National Research Council, National Academy of Sciences, Washington, D.C., 1965.

Papers on current problems concerning legal procedures by which highway programs are carried out. The first four deal with planning, construction and operation of highway systems - eminent domain, the police power, contracts, and intergovernmental relationships. The next four are concerned with use of air space in connection with highway transportation, defining the function of the legal doctrine of sovereign immunity, correlating laws relating to highways and laws relating to drainage, etc. Extensive legal citations are given in several of the papers.

H-037

Highway Research Board.
HIGHWAY ADMINISTRATION. Highway Research Board Bibliography 19. National Research Council. National Academy of Sciences, Washington, D.C., 1957.

A bibliography of 362 entries. Author and subject indexes are provided.

H-038

Highway Research Board.
HIGHWAY AND INTERCHANGE CAPACITY. Highway Research Record, no. 27. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963.

Reports on the operation of expressways are given. "Traffic operation at two interchanges in California" describes the specific application to two problem situations of a continuing study whose purpose is to achieve better design in future freeways. One problem area involved a cloverleaf-type interchange without collector roads where weaving was a problem, the other was a major bottleneck at an on-ramp. Another study from California discusses capacity on rural and urban freeways. Freeway ramp capacity is studied in a third paper. Traffic flow characteristics are investigated in a fourth paper in relation to the goal of reducing or eliminating traffic congestion. A study of four-way stop intersections is reported: One of the papers, dealing with 30th peak hour factor trend, has been abstracted and appears in the Bibliography under B-016.

H-039

Highway Research Board.
HIGHWAY CAPACITY MANUAL 1965. Highway Research Board Special Report 87. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

A practical manual for determining Highway capacity including: highway design, traffic control and operations, traffic flow, and traffic measurements.

H-040

Highway Research Board.
HIGHWAY CORRIDOR PLANNING AND LAND ACQUISITION. Highway Research Record, no. 166. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967.

Nine papers which cover the highway corridor as a planning and design concept, problems involved in implementing corridor plans by legal techniques, application of the corridor concept to a nationwide system of scenic highways, the highway corridor and intergovernmental cooperation, the transportation system corridor, implementation of the corridor concept through eminent domain, acquisitions of scenic easements, and elimination of roadside advertising signs and junkyards.

H-041

Highway Research Board.
HIGHWAY ECONOMICS. Highway Research Record, no. 12. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963.

Seven reports on: the effect of highway improvement on travel time, concepts of the value of time, direct costs and frequencies of motor-vehicle accidents, benefit-cost ratios, the annual cost of highways, programming highway accident reduction, and an economic replacement model for highway surfaces. Five of these reports have been abstracted and appear in the bibliography under F-005, H-009, J-006, S-014, and W-019.

H-042

Highway Research Board.
HIGHWAY FINANCE AND BENEFITS. Highway Research Record, no. 138. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966.

H-043

Highway Research Board.
HIGHWAY FINANCE: SELECTED REFERENCES, 1950-1953. Highway Research Board Bibliography 16. National Research Council. National Academy of Sciences, Washington, D.C., 1954.

Contains 484 references on such specific topics as: Highway taxation, expenditures, borrowing for highways, financial programs and plans and statistics.

H-044

Highway Research Board.
HIGHWAY FINANCING. Highway Research Record, no. 20. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963.

Ten reports on: highway bond financing, special assessment financing of major highway improvements, selection of a county distribution formula for state road assistance in Mississippi, model for funds allocation for urban highway-systems capacity improvements, the place of subsidies in an optimum transportation system, nonuser revenues, nonuser benefits, road test findings applied to state highway cost allocation studies, applications of earnings-credit and relative-use methods of highway cost allocation.

H-045

Highway Research Board.
HIGHWAY LAW COMMENT. Highway Research Circular, no. 66. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., July 1967.

Highway Law Comment is complied by the Department of Legal Studies of the Highway Research Board. This specific issue contains articles on the effects of disclosure of information relating to subsurface conditions, a review of recent cases on the duty of disclosure of information to contract bidders, and a summary of Wisconsin's legislative problems in its scenic easement program. There are also bibliographical notes on recent legal periodical writings and papers. These citations are arranged by category; access rights, air space, contracts, eminent domain, highways and streets, inverse condemnation, scenic roads development, tort liability, and zoning and land use controls.

H-046

Highway Research Board.
HIGHWAY NEEDS AND PROGRAMMING PRIORITIES. Highway Research Board Bulletin 249. National Research Council. National Academy of Sciences, Washington, D.C., 1960.

Contains four articles on: a congestion approach to rational programming, advance programming methods, highway expenditures programming, estimation of primary road needs. Two of the papers have been abstracted and appear in this bibliography under G-003 and G-012.

H-047

Highway Research Board.
HIGHWAY PROGRAMMING: AN ANALYSIS OF STATE LAW. Highway Research Board Special Report 70. National Research Council. National Academy of Sciences, Washington, D.C., 1962.

An analysis and summary of various state laws on long-range highway programs, annual programs, financing and programming, budgets and programming, reports, determination of future highway needs, project priorities, and intergovernmental cooperation. Highway programming legislation was found in only a few states, and the existing legislation was examined. The most direct legislative support for highway programming was found in laws authorizing long-range highway programs. In Pennsylvania, a Highway Planning Commission was created in 1949 to develop a long range highway program. Most states provide general authority to establish current and long-range highway

programs, with the highway department preparing annual construction programs with project priorities. A summary of findings in the states is provided as well as an introduction to highway programming. The appendix contains a summary of statutes by state.

H-048

Highway Research Board.
HIGHWAY RESEARCH BOARD PUBLICATIONS. JANUARY 1967. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967.

Each available publication is listed twice: first by subject and then by the Highway Research Board publication series of which it is a part. Subjects covered include: accidents, administration and management, aggregates, bases and subbases, bituminous materials and mixtures, traffic (general), urban transportation research (general) and vehicles. The prices are given. A basic guide to basic material.

H-049

Highway Research Board.
HIGHWAY RESEARCH NEWS. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., Spring 1967.

Highway Research News is now published quarterly. It contains profiles on persons prominent in the field; news on research through the National Cooperative Highway Research Program (NCHRP) and other domestic and foreign groups. Each issue contains two feature articles on new techniques, equipment, etc. Book reviews are presented and new HRB publications listed.

H-050

Highway Research Board.
HIGHWAY RESEARCH NEWS, no. 13. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., June 1964.

Eight articles on accident reports: relationships between traffic volume, median width, and accident frequency; studies of medians; evaluation of improvement projects; computer methods for traffic count analysis; systems analysis approach to processing of vehicular traffic records from continuous-count stations and grading and rock problems encountered during a railway relocation. Three of these have been abstracted, and appear in the bibliography under H-110, P-023, and P-031.

H-051

Highway Research Board.
HIGHWAY RESEARCH NEWS no. 15. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., November, 1964.

In addition to reports of constituent committees on such areas as maintenance costs, the durability of concrete, coating, sign and marking materials, this and earlier

issues of the publication contain summaries of court decisions in the general area of land acquisition for road building and ancillary purposes.

H-052

Highway Research Board.
HIGHWAY SAFETY 1963 and 1964. Highway Research Record, no. 79. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

The causes and characteristics of single-car accidents based upon reports of about 5,200 cases, were analyzed are described in one paper. Personality and biographical variables in relation to driving item response, the totally deaf driver, methods of determining high-accident locations, hazard-reducing improvements, safe design, and adapting the highway to the human element, are subjects discussed in further reports. Of the nine papers one has been abstracted and appears in this bibliography under A-004.

H-053

Highway Research Board.
HIGHWAY SYSTEM CLASSIFICATION: A LEGAL ANALYSIS. Part 1. Highway Research Board Special Report 42. National Research Council. National Academy of Sciences, Washington, D.C., 1959.

A legal guide for states re the objects and nature of a primary highway system. The need for functional traffic systems is discussed with the state highway department suggested as the administrative body. Legislatures may be more repsonsive to state needs than highway departments and a combination of the two appears desirable. If a state proposes to revise its highway classification law, the following elements should be considered: declaration of legislative purpose for interpreting statues; separability or severability clause for protection against total invalidation; definition of terms to avoid ambiguity; statement of objectives, designation of a system or reclassification of a system; provision for additions or deletions to the primary highway system; contraction of system size when no specific legal authority exists for doing so; reference to municipal connecting links. Pennsylvania practice on methods of making changes is shown in the summary below.

PENNSYLVANIA

Statutes

Primary highway system composed of main-traveled highways authorized by law, and connecting county seats and principal municipalities. Additions made by Legislature but Department of Highways may lengthen or shorten routes to provide connections with other State highways. Department may make revisions in the interest of safety and subject to approval of Governor. Deletions generally by Legislature but Department may delete sections superseded by relocation. Superseded sections not over 2.5 miles in length in townships, boroughs or incorporated towns may be closed if not necessary for public travel, subject to approval of Governor. Municipal connecting links designated by Legislature. Department may alter routes in cities of first class, second class, second class A and third class with approval of Governor. May delete routes, with approval of Governor, in townships, boroughs and incorporated towns.

Judicial Decision

Petition of Turkey Run Fuels, Inc., 173 Pa. Super. 76, 95 A.2d 370 (1953), held Court of Quarter Sessions might vacate "State roads" when they no longer form part of a "State highway."

H-054

Highway Research Board.
HIGHWAY SYSTEM CLASSIFICATION: A LEGAL ANALYSIS. Part 2. Highway Research Board Special Report 85. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

A report on the statutory provisions for the secondary state highway systems under the control of the state highway departments; the highway systems under control of political subdivisions of the state; and municipal systems. The highway classification system of statutory authority for the states is given together with the prevailing patterns. A resolution adopted by the Pennsylvania legislature in 1963 provides for creation of a highway classification committee to study the functional uses of state and local highway systems. The well-defined relationship existing between the Federal-aid primary system and the State primary systems is noted. The advantages in the separation of state roads into primary and secondary categories are discussed. The advantages and disadvantages of a secondary highway classification are reported, together with means of designation, objectives, additions and changes, and municipal extensions of the secondary highway system. Local rural and municipal highway systems are similarly treated. Appendices include: summary of statues pertaining to classification of highways below the primary state level and drafting guides for comprehensive highway system classification legislation.

H-055

Highway Research Board.
HIGHWAYS AND ENVIRONMENTAL QUALITY. Highway Research Record, no. 182. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967.

Six papers concerning the aesthetics of highway transportation are presented. Papers include information on providing desirable scenery as viewed from the highway, a procedure for evaluating the relative visual quality of specific segments of highways, research on perceptions of highway environmental quality, methods of estimating benefits from scenic enhancement of highways, costs and feasibility of the Highway Beautification Act of 1965, and legal measures for preserving scenic beauty along transportation corridors.

H-056

Highway Research Board.
INDIRECT EFFECTS OF HIGHWAY IMPROVEMENT: 1962 Highway Research Board Bulletin 327. National Research Council. National Academy of Sciences, Washington, D.C., 1962.

A series of five papers. Two of these deal with land-use planning and the interchange community, and highway location and economic development. The remaining three

have been abstracted and appear in this Bibliography under L-021, S-041 and T-003.

H-057

Highway Research Board.
INDIRECT EFFECTS OF HIGHWAY LOCATION AND IMPROVEMENTS. Highway Research Record, no. 96. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

Contains five reports on the influence that highway improvements have on adjacent areas, particularly with respect to the land value impact of highways. Community consequences and response to highway improvement, commercial highway service districts, and highway interchange area development are covered. All five reports have been abstracted and appear under A-077, F-004, H-106, M-017, and T-002.

H-058

Highway Research Board.
INTERGOVERNMENTAL COOPERATION IN HIGHWAY AFFAIRS: A RECOMMENDED ACTION PROGRAM FOR EFFECTIVE RELATIONSHIPS. Highway Research Board Special Report 9. National Research Council. National Academy of Sciences, Washington, D.C., 1953.

Recommendations mutually agreed upon by the members of the Advisory Committee for the Cooperative Project on Intergovernmental Relationships in Highway Affairs are discussed. These recommendations include the areas of: highway classification, uniform standards, planning and programming, organization and management, and authority and responsibility. If efficient highway administration and good relationships are to exist, each of these functions must be clearly defined and assigned to a particular level of government. The functions in each area of highway administration that should be performed by local, state, and federal agencies are described.

H-059

Highway Research Board.
A KEY TO CHANGE: URBAN TRANSPORTATION RESEARCH. Highway Research Board Special Report 69. National Research Council. National Academy of Sciences, Washington, D.C., 1962.

Panel discussions on such aspects of the subject as changing land use patterns, human values related to urban transportation, economic development, political factors and administration and financing of urban transportation. Thirteen research proposals were made in the above fields and are indexed by subject at the end.

H-060

Highway Research Board.
LAND ACQUISITION 1963. Highway Research Record, no. 54.
Highway Research Board. National Research Council.
National Academy of Sciences, Washington, D.C., 1964.

Nine reports on highway land acquisition, application of the critical path method to a highway right-of-way operation, highway condemnation law, highway severance damage studies, community effects on remainder parcel valuation, and a computer technique for caluclating costs of right-of-way. One report has been abstracted and appears in the Bibliography under B-026.

H-061

Highway Research Board.
LAW OF TURNPIKES AND TOLL BRIDGES. Highway Research Board Special Report 83. National Research Council. National Academy of Sciences, Washington, D.C., 1964.

Contains a consideration of Federal authority and State authorization legislation on the subject. Organization, powers and duties as well as financing, debt limitations, bond provisions, interest rates, etc. of toll authorities are included. Miscellaneous major provisions such as property damage and personal injury, conflict of interest, and regulation of toll facility use are cited. It also contains 4 Appendixes (for example, parts of which are illustrated on pages 87 to 96 for Pennsylvania and several other states) including: tables on certain provisions of state laws; cases and federal statutes; a selected bibliography; and a list of major toll highways in the United States as of October, 1963.

H-062

Highway Research Board.
MOTOR VEHICLE SPEED, VOLUME, WEIGHT AND TRAVEL TIMES. Highway Research Board Bulletin 303. National Research Council. National Academy of Sciences, Washington, D.C., 1961.

Contains eight articles on the effect of speed limit signs on speed on suburban arterial streets, effects on speed and accidents of improved delineation at hazardous locations, application of mechanical analysis to traffic recorder data, statistical evaluations of truck weight characteristics, a study of urban travel times in Pennsylvania cities, effects of commercial roadside development on traffic flow, development and use of maximum-car technique for measuring travel time, and an analysis of urban travel times and traffic volume characteristics. One of these articles has been abstracted and appears in the Bibliography under C-021.

H-063

Highway Research Board.
NIGHT VISIBILITY. Highway Research Record, no. 179. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967.

Of the seven reports, one summarizes an experimental study of luminance requirements for illuminated signs, another gives the results of an investigation of the effect of spray from passing vehicles on milepost markers, another describes a method for obtaining pavement reflectance data, a fourth gives the results of a study of the use of expanded metal mesh as an anti-glare screen and a fifth describes the use of pavement delineation materials at night. The other two articles have been abstracted and appear in this bibliography under R-005 and T-006.

H-064

Highway Research Board.
ORIGIN AND DESTINATION. Highway Research Record, no. 141. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966.

Four papers concerning urban transportation problems are presented, including an

Table 1. State Toll Facilities Legislation Analysis: General Authorization (continued)

State	Legislative Citation	Basic Purpose	Declaration of Policy	Authorization and Procedural Matters	Definitions
Ohio (cont'd) (3)	§§5593. 01 to 5593. 19	General; bridges or partially constructed bridges or toll bridges over rivers and navigable waters forming a city or county boundary or whose approaches extend within boundary (any city or county bridge commission)		Same as above, but may construct bridges and issue bridge revenue bonds of the State, county, or city.	Same as above
Okla. (1)	Okla. Stats. 1951, tit. 69, §§651 to 695	Specific. (1) Turnpike between Oklahoma City and Tulsa; (2) Oklahoma part of turnpike between Oklahoma City and Wichita Falls, Texas; (3) the Northeastern (Will Rogers) Turnpike; (4) a turnpike, or part or parts, from Oklahoma-Texas line east of Norman and Oklahoma City to Turner Turnpike and Arkansas River, then toward Texas border (Oklahoma Turnpike Authority)	To provide modern express highways with every safety device; to facilitate vehicular traffic; to remove handicaps and hazards on congested highways; to increase commerce and prosperity; and to improve health and living conditions, thereby performing an essential State governmental function	Authorized to construct, maintain, repair, and operate above specific turnpike projects, and others when authorized by Legislature; to issue turnpike revenue bonds of the authority to pay all or part of the cost and to apply to the Supreme Court of the State for approval of issuance; to carry liability insurance; collect tolls; and do other necessary things, with certain construction contract restrictions.	"Authority," "project" or "turnpike project," "cost," "owner," and "business for profit"
(2)	tit. 69, §§111 to 124	General, any interstate toll bridge or toll bridge connecting State highway system (State Highway Commission)		Authorized to acquire for State any such bridge; to maintain, repair, and operate it; and to issue bridge revenue bonds and to collect tolls only until bonds paid.	
(3)	tit. 69, §§391 to 397	General; any toll bridge in any county (Board of County Commissioners)		Authorized to acquire by purchase out of its road and bridge fund, by bond issue, or by condemnation such toll bridges for the county for toll-free use.	
Pa. (1)	Purdon's Pa. Stats. Ann., tit. 36, §§652a to 652u; 654. 1 to 654. 3; 659. 1 to 659. 7	Specific. At such locations as shall be approved by the Department of Highways, from a point at or near Middlesex in Cumberland County to a point at or near Irwin in Westmoreland County (Pennsylvania Turnpike Commission)	To provide for the construction of the Pennsylvania Turnpike in order to facilitate vehicular traffic between the eastern and western sections of the Commonwealth; to promote the health, safety, and welfare of the citizens, both in peace time and emergencies, by widening it, to improve commerce and prosperity and provide for the general welfare, thereby performing an essential governmental function	To construct, operate, and maintain a turnpike with connecting tunnels and bridges; to widen it to four lanes and/or construct additional tunnels; and to issue turnpike revenue bonds to pay the cost and to collect tolls.	"Commission," "owner," "the turnpike," "cost of the turnpike," "Turnpike," "Eastern Extension," "Western Extension," "Delaware River Extension," "project," "Pennsylvania Turnpike System," and "cost"
(2)	§§653 to 653s; 654. 1 to 654. 3; 659. 1 to 659. 7	Specific. Pennsylvania Turnpike Philadelphia Extension (Eastern Extension) extending from a point at or near Middlesex in Cumberland County to a point at Philadelphia; location to be approved by governor and Department of Highways	To facilitate vehicular traffic between the eastern and western sections	To construct, operate, and maintain an eastern extension to the turnpike with connecting roads, tunnels, and bridges; to issue turnpike revenue bonds to pay cost; and to collect tolls.	See above
(3)	§§654 to 654r; 654. 1 to 654. 3, 659. 1 to 659. 7	Specific. Western Pennsylvania Turnpike Extension, extending from a point at or near Irwin in Westmoreland County to a point at western boundary line of Pa., touching on Ohio or W. Va., location to be approved by governor and Department of Highways	See above	To construct, operate, and maintain a western extension to the turnpike, to combine the turnpike and the eastern and western extensions, or any two, for financing purposes and fix and revise tolls for projects so combined, to issue revenue bonds of the Commonwealth, and to collect tolls.	See above
(4)	§§659. 1 to 659. 7, 660. 1 to 660. 20	Specific. Pennsylvania Turnpike System Northeastern Extension, extending from a connection with Turnpike at a point east of Susquehanna River to a point on or near the Pa. -N. Y. line, between the Susquehanna and Delaware Rivers at Sayre, with connections to Susquehanna and Delaware Rivers, location to be approved by governor and Department of Highways	To facilitate vehicular traffic across the State, and to provide additional traffic facilities to the industrial communities in the northeastern section	To construct, operate, and maintain a northeastern extension to the Pennsylvania Turnpike System; to issue turnpike revenue bonds of the Commonwealth and to collect tolls.	See above

Table 1. State Toll Facilities Legislation Analysis: General Authorization (continued)

State	Legislative Citation	Basic Purpose	Declaration of Policy	Authorization and Procedural Matters	Definitions
Pa. (cont'd) (5)	§§659.1 to 659.7; 667.1 to 667.20	Specific. Pennsylvania Turnpike System Gettysburg Extension, extending from a connection with the System at a point west of Susquehanna River to Pa.-Md. line, in vicinity of Gettysburg; location to be approved by governor and Department of Highways	To facilitate vehicular traffic in southeastern Pennsylvania	To construct, operate, and maintain an extension to the Turnpike System in southeastern Pennsylvania, to issue turnpike revenue bonds, notes, or other obligations payable solely from revenues, or any funds available to the Commission, and to collect tolls	See above
(6)	§§658.1 to 658.20, 659.1 to 659.7	Specific. Pennsylvania Turnpike Delaware River Extension, extending from a bridge to New Jersey to Eastern System Extension; location to be approved by governor and Department of Highways	To facilitate vehicular traffic across the Commonwealth	Commission authorized to acquire as turnpike cost the use, operation, and maintenance, for itself or jointly with any like body, a bridge to New Jersey; or to construct, operate, and maintain such bridge alone or jointly with the New Jersey Turnpike Authority, or to contract therewith for its construction, operation, and maintenance, to connect such bridge with the Pa. Turnpike System by constructing, operating, and maintaining an extension from its Eastern Extension; to issue turnpike revenue bonds, notes, or other obligations payable solely from revenues, including tolls, or any funds available to commission, and to collect tolls and other charges	See above
(7)	§§652.1 to 652.20	Specific, Pennsylvania Turnpike Philadelphia Loop Extension, extending in a northerly direction from a point near Chester to connect with the Pa. Turnpike System	To facilitate vehicular traffic in southeastern Pennsylvania	To construct (as a whole at one time or in sections from time to time) operate, and maintain a toll extension to connect with the Pennsylvania Turnpike System, with connecting roads, tunnels, and bridges; to acquire all property and rights necessary thereto; to issue revenue bonds, notes, and other obligations payable solely from commission revenues or other available commission funds to finance construction; and to collect tolls	See above
(8)	§§666.1 to 666.19	Specific, Pennsylvania Turnpike Keystone Shortway, extending from or near Sharon in Mercer County to or near Stroudsburg in Monroe County	To facilitate vehicular traffic in central Pennsylvania	Same as above	See above
(9)	§§668.1 to 668.19	Specific; Northwestern Extension, from Erie in Erie County, southerly to connect with the Pa. Turnpike System, including a lateral eastward extension westward to the Pennsylvania-Ohio boundary	To facilitate vehicular traffic in west and northwest Pennsylvania	Same as above	See above
(10)	§§669.1 to 669.19	Specific; Southwestern Extension, from Pittsburgh southerly to the West Virginia border to connect with the West Virginia Turnpike or extension	To facilitate vehicular traffic in southwestern Pennsylvania	Same as above	See above
(11)	§§655.1 to 655.17	Specific. Pocono Mountain Memorial Parkway, from a point at or near Delaware Water Gap to a point at or near Milford in Pike County, as located by Department of Highways (Pennsylvania Parkway Commission)	Parkway to be planned to avoid congested areas and designed to serve primarily tourist traffic and passenger vehicles; to be constructed wherever possible over and through forest, game, or fish lands and to be dedicated as a memorial to sons and daughters of Pennsylvania who served in World Wars I and II	Pennsylvania Parkway Commission is authorized to construct, operate, and maintain a parkway, together with connecting tunnels and bridges; to issue parkway revenue bonds payable solely from tolls and to collect tolls	"Commission," "owner," "parkway," and "cost of parkway"
R. I. (1)	Gen. Laws of R. I. 1956, §§24-12-1 to 24-12-47	Specific. A turnpike from a point at or near the Conn.-R.I. border to a point at or near Tiverton; to Jamestown Bridge; Newport Bridge; Mount Hope Bridge and additional facilities (Rhode Island Turnpike and Bridge Authority)	To facilitate vehicular traffic, remove handicaps and hazards on congested highways, and promote the agricultural and industrial development of the State	Authority authorized to construct Newport Bridge and the turnpike; to acquire the Jamestown Bridge and the Mount Hope Bridge; to maintain, repair, and operate them; to issue its revenue bonds; to fix and collect tolls on each; and do necessary things	"Authority," "Newport Bridge," "Jamestown Bridge," "turnpike," "ferry franchise," "additional facility," "project," "cost," and "owner"

Table 2. State Toll Facilities Legislation Analysis: Administration (continued)

State	Name	Membership	Terms	Quorum	Bond	Salary
N. Y. (cont'd) (2)	New York State Thruway Authority, a public corporation, to exist so long as it has obligations outstanding and until terminated by law.	Three members, including chairman, appointed by governor with consent of senate.	Originally appointed for varying terms; successors to serve staggered nine year terms	Majority		Reimbursement for actual expenses and $19,000 per year for chairman; other members $17,000
(3)	Jones Beach State Parkway Authority, a public benefit corporation.	Composed of commissioners of Long Island State Park Commission; if commission shall cease to exist, board shall consist of three members appointed by governor with consent of senate.	Six years	Majority of members then in office		No compensation; to be reimbursed for expenses
(4)	Triborough Bridge and Tunnel Authority, a public benefit corporation, successor to New York City Tunnel Authority.	Board composed of three members appointed by mayor who names chairman and fills vacancies for unexpired term and may remove any member for cause, after hearing or opportunity. Board may delegate powers and duties.	Six years	Majority		No compensation; actual expenses reimbursable
(5)	New York State Bridge Authority	Five members appointed by governor with consent of senate. Vacancies for unexpired term filled in same manner. Board shall choose from its members a chairman.	Staggered five year terms			No compensation, reimbursed for expenses
(6)	Ogdensburg Bridge and Port Authority	Nine members appointed by governor with consent of senate. Vacancies filled for unexpired term by governor. Board shall annually elect a chairman, vice-chairman, secretary, and treasurer.	Five members to serve staggered five year terms, remaining four to serve until Jan. 1, 1965, all to serve until qualification of successor	Majority then in office		No compensation; expenses reimbursable
Ohio (1)	Ohio Turnpike Commission	Four members, appointed by governor, with advice and consent of senate, no more than two of whom shall be members of the same political party, and the director of highways, who shall be a member ex officio without compensation. Appointive members to be residents of State, and shall have been qualified electors therein for at least five years preceding their appointment. Commission shall elect one appointed member chairman, another vice-chairman, and shall appoint a secretary-treasurer who need not be a member. All members eligible for reappointment; vacancies filled for unexpired term only	Staggered eight year terms	Three members	Secretary-treasurer $50,000, other members $25,000, all approved by governor	$5,000, plus expenses
(2)	State Bridge Commission of Ohio	Three successful businessmen appointed by governor, not more than two of the same political party. Governor designates chairman and fills vacancies for unexpired term. Any commissioner eligible for reappointment. Commission shall appoint a secretary treasurer	Six years		Each member $10,000, approved by governor	$2,000 per year and expenses
(3)	City or County Bridge Commission	Upon passage of resolution three commissioners appointed by board of county commissioners or city legislative authority, not more than two to belong to the same political party, all eligible for reappointment. Vacancies filled for unexpired term. Commission appoints secretary treasurer.	Staggered six year terms		$5,000 each commissioner	Not over $2,000 per year and expenses
Okla.	Oklahoma Turnpike Authority, an instrumentality of the State.	Composed of governor and one member from each congressional district appointed by him with consent of senate. Appointees to be residents of State and qualified electors therein for at least a year and are eligible for reappointment. Vacancies filled for unexpired term. Authority shall elect one appointed member chairman and another vice-chairman, and shall also elect a secretary and treasurer	Originally appointed for varying terms, successors to serve staggered eight year terms	Majority	$25,000 for appointed members, secretary and treasurer $100,000 each, all approved by governor	Actual expenses only
Pa. (1) through (10)	Pennsylvania Turnpike Commission, an instrumentality of the Commonwealth, created by act of May 21, 1937 (Pamphlet Law 774)	Commission consists of five members, four appointed by governor with consent of 2/3 of senate, and Secretary of Highways ex officio member. Members shall elect one appointed member chairman and a secretary and treasurer who may not be a member	Ten years, staggered, for appointed members, all eligible for reappointment. Vacancies filled for unexpired term	Three members	$25,000 each appointed member, $40,000, secretary and treasurer, all approved by governor. Bonds cancelled when extension is designated part of system	Increased to $15,000 for chairman and $14,000 for other appointed members, plus expenses of members
(11)	Pennsylvania Parkway Commission, an instrumentality of the Commonwealth.	Consists of three members, two residents of Commonwealth and qualified electors therein for at least one year preceding appointment by governor with consent of 2/3 of senate, and the secretary of highways ex officio. One appointed member to be elected chairman and a secretary and treasurer shall be elected who may not be a member.	Ten years (staggered)	Two members	$25,000 each appointed member, secretary and treasurer $50,000	$6,000 each appointed member, and all members reimbursed expenses

Table 3. State Toll Facilities Legislation Analysis: Powers and Duties (continued)

State (cont'd)	(11) To Vacate Affected Highways When Necessary	(12) To Enter for Surveys	(13) To Control or Provide for Installation or Relocation of Public Utilities	(14) To Sell or Lease Unneeded Land	(15) To Fix Toll Rates or Other Charges	(16) To Authorize Concessions on Project	(17) Make Annual Report	(18) Annual Audit	(19) To Take Immediate Possession of Land	(20) To Acquire More Land Than Necessary For Project	(21) To Charge Tolls After Bonds Paid	(22) To Conduct Research and Studies
N. Y. (cont'd) (6)		Yes, and in Canada	Yes		Yes, after State advances reimbursed; prior thereto State budget director must approve						Yes	
Ohio (1)	Yes, upon petition to county court wherein located	Yes	Yes		Yes	Yes	Yes	Yes	Yes, upon deposit of the amount assessed; proceedings to be expedited		No	
(2) & (3)					Yes, but subject to any Federal or State public utility law requirements			Yes, books of State bridge commission by State auditor; no provision as to county and city commissions	Same as above		Yes, for operation and to repay any debt to State	
Okla. (1)		Yes	Yes		Yes	Yes, and real and personal property so leased subject to taxation as other privately owned property	Yes	Yes	Yes, upon deposit of sum assessed	No	No, but if bonds for any project unpaid tolls continued on all projects until bonds for all projects paid	
Pa. (1)		Yes	Yes	Yes	Yes	Yes			Yes		No	
(2)		Yes	Yes	Yes	Yes	Yes			Yes			
(3)		Yes	Yes	Yes	Yes	Yes			Yes			
(4)	Yes	Yes	Yes	Yes	Yes	Yes			Yes			
(5)	Yes	Yes	Yes	Yes	Yes	Yes			Yes			
(6)	Yes	Yes	Yes	Yes	Yes	Yes			Yes			
(7)	Yes	Yes	Yes	Yes	Yes	Yes			Yes			
(8)	Yes	Yes	Yes	Yes	Yes	Yes			Yes			
(9)	Yes	Yes	Yes	Yes	Yes	Yes			Yes			
(10)	Yes	Yes	Yes	Yes	Yes	Yes			Yes			

Table 3. State Toll Facilities Legislation Analysis: Powers and Duties (continued)

State (cont'd)	(11) To Vacate Affected Highways When Necessary	(12) To Enter for Surveys	(13) To Control or Provide for Installation or Relocation of Public Utilities	(14) To Sell or Lease Unneeded Land	(15) To Fix Toll Rates or Other Charges	(16) To Authorize Concessions on Project	(17) Make Annual Report	(18) Annual Audit	(19) To Take Immediate Possession of Land	(20) To Acquire More Land Than Necessary For Project	(21) To Charge Tolls After Bonds Paid	(22) To Conduct Research and Studies
Pa. (cont'd) (11)		Yes	Yes	Yes	Yes	Yes			Yes			
R. I. (1)	Yes, and streets	Yes	Yes		Yes	Yes	Yes, to governor	Yes, by State director of administration	No, but expedited			
Tex. (1)	No	Yes	Yes	Yes	Yes	Yes	Yes, to governor and legislature	Yes	No	Yes, severed land	No	Yes
Va. (1)	Yes	Yes	Yes	Yes. To reconvey	Yes	Yes	Yes	Yes	After failure to purchase, yes, upon deposit into court		No	
(2)	Yes		Yes		Yes				No		Yes	
(3)	Yes	Yes	Yes		Yes	Yes	Yes, to governor	Yes			No	Yes
(4)	Yes	Yes	Yes		Yes		Yes, to governor and political subdivision it passes through	Yes			No	
(5)	Yes	Yes	Yes		Yes		Yes	Yes			No	
Wash. (1)					Yes			Accounts shall be kept open to inspection of bondholders			Yes	Yes
(2)					Yes						Yes	Yes
(3)					Yes, but approval of consulting engineer required for tariff change							Yes
W. Va (1)	Upon request of commission, State road commissioner shall vacate any road	Yes	Yes	Yes	Yes	Yes					Yes, to pay bonds issued for other projects	
Wis. (1)		Yes	Yes	Yes	Yes	Yes	Yes	Yes			No	Yes. May enter into contract for studies

State	(1) To Acquire Land by Eminent Domain	(2) To Construct and Maintain	(3) To Locate	(4) To Control Access	(5) To Contract	(6) To Employ Consultants	(7) To Accept Federal Aid	(8) To Incorporate State Highways in Project	(9) Project To Be Incorporated In State Highway System When Bonds Paid	(10) To Relocate State Highways
N. Y. (cont'd) (6)	Yes	Yes	Yes, as approved by superintendent		Yes	Yes, and legal consultants in Canada	Yes	Yes	Yes. Conveyed to State, including right to charge tolls	
Ohio (1)	Yes	Yes	Location to be approved by and design standards approved by director of highways	Yes	Yes	Yes	Yes, with approval of governor		Yes, if in good condition	Yes
(2) & (3)	Yes, and in adjoining State, and all powers conferred by Congress	No, to improve and maintain existing bridges			Yes	Yes		Yes, if connected therewith at both ends		
Okla (1)	Yes, surface rights only	Yes	Yes, most feasible route between designated termini	Yes	Yes, with certain restrictions and limitations	Yes, but to be kept at minimum and reported to legislature	Yes, and comply with Federal highway aid rules and laws	Yes	Yes, if in good condition	Yes, as approved by State highway commission
Pa. (1)	Yes	Yes, construction contracts to be approved by department of highways and construction to be under its supervision; to be maintained by department, under control of commission	Termini indicated, exact location to be approved by department of highways and governor		Yes	Yes			Yes	
(2)	Yes	Yes, construction and maintenance to be by department of highways under control of commission	Location to be approved by governor and department of highways		Yes, construction contracts to be approved by department of highways	Yes			Yes	Yes, subject to approval of department of highways
(3)	Yes	Same as above	Same as above		Same as above	Yes			Yes	Same as above
(4)	Yes	Yes. Turnpike to be constructed under supervision of department of highways; maintenance by and under control of commission through the department	Same as above		Yes, all construction contracts shall be approved by department	Yes			Yes	Same as above
(5)	Yes	Same as above	Same as above		Same as above	Yes			Yes	Same as above
(6)	Yes	Same as above	Same as above		Same as above	Yes			Yes	Same as above
(7)	Yes	Same as above	Same as above		Same as above	Yes			Yes	Same as above
(8)	Yes	Same as above	Same as above		Same as above	Yes			Yes	Same as above
(9)	Yes	Same as above	Same as above		Same as above	Yes			Yes	Same as above
(10)	Yes	Same as above	Same as above		Same as above	Yes			Yes	Same as above

State	(1) To Acquire Land by Eminent Domain	(2) To Construct and Maintain	(3) To Locate	(4) To Control Access	(5) To Contract	(6) To Employ Consultants	(7) To Accept Federal Aid	(8) To Incorporate State Highways in Project	(9) Project To Be Incorporated In State Highway System When Bonds Paid	(10) To Relocate State Highways
Pa. (cont'd) (11)	Yes	Yes, construction and maintenance to be through department of highways under control of commission	Parkway to be constructed in accordance with survey made by department of highways		Yes, construction contracts to be approved by department of highways	Yes			Yes	
R. I. (1)	Yes	Yes	Yes, with approval of director of public works	Yes	Yes	Yes	Yes		Yes	Yes
Tex. (1)	Yes, but only for road and right-of-way purposes	Yes	Yes, as approved by State highway commission	Yes	Yes	Yes	From any source		Yes, if in good condition	Yes
Va. (1)	Yes	Yes	Yes, as approved by governor	Yes	Yes	Yes	Yes		Yes, if in good condition	Yes
(2)	Yes	Yes			Yes	Yes	Yes	Yes		Yes
(3)	Yes	Yes	Yes, as approved by State highway commission		Yes	Yes	Yes	Yes	Yes, if in good condition	Yes
(4)	Yes	Yes	Same as above	Yes	Yes	Yes	Yes		Same as above	Yes
(5)	Yes	Yes	Same as above	Yes	Yes	Yes, and they permitted to have interest in contract and sell to authority	Yes		Same as above	Yes
Wash. (1)	Yes, director of highways acquires on orders of authority	No, by director of highways	Yes, except projects requiring specific authorization		Director of highways shall contract for construction. Authority and State officials may make desirable agreements	No, to use State personnel	Yes	Yes		
(2)	Yes, when legislature authorizes project	Same as above			Same as above			Yes		
(3)	Yes, in consolidated proceedings	Yes	Yes		Yes			Yes		
W. Va. (1)	Yes	Yes	Yes, with approval of State road commission	Yes	Yes; but over $1,000 only with approval of governor	Yes	Yes	Yes	Yes, if in good condition	Upon request of commission, State road commissioner shall relocate any road
Wis. (1)	Yes	Yes	Yes, (exact route and exact termini)	Yes	Yes	Yes	Yes		Yes	Yes

(A) Bonds

State	(1) Authority to Issue	(2) Rate of Interest	(3) Period of Amortization	(4) Interim or Temporary Bonds	(5) Negotiable Instruments	(6) Restrictions on Sale Price	(7) Public or Private Sale	(8) Pledging Credit of State	(9) Exemption from Taxation	(10) Investment by Public Institutions	(11) Refunding Provisions	(12) Other Re Securities
N. Y (cont'd) (3)	Yes, to $40 million	At lowest interest cost, or highest price	Not later than 40 years	May borrow money on bank loans	Yes	To be sold at lowest interest cost, or highest price, as authority determines, but not for less than 98% of par value plus accrued interest	Public	No	Same as above	Yes	Yes	
(4)	Yes	Not to exceed 4%, payable semiannually	Not over 50 years	Five year notes	Yes	For such price or prices as authority determines	Either		Yes	Yes	Yes	Throgs Neck and Narrows Bridge bonds redeemable as a whole in 15 or more years at 104% of face value and interest
(5)	Yes, not exceeding $70 million, and notes	As authority determines, payable semiannually	Not over 50 years		Yes	Same as above	Either	No	Yes, except for estate and transfer taxes	Yes	Yes	State pledges not to modify bonds and notes to injury of other holders
(6)	Yes, and notes to pay cost of ferries	Not to exceed 5%, payable semiannually	Not to exceed 40 years		Yes	For a price not less than 96% of par value, plus accrued interest, but interest cost not to exceed 5%	Public	No, nor of county	Yes, except for estate taxes	Yes	Yes	
Ohio (1)	Yes, of the State	Not over 5%	Not over 40 years	Yes	Yes	For such price as commission may determine, but interest on money received not to exceed 5% per annum	In such manner as commission may determine	No	Yes		Yes, and may issue for improvements and extensions	Bond issuance need not comply with any other law
(2) & (3)	Yes	Not over 6%, payable semiannually	Not over 30 years	Yes	Yes	Same as above, but interest not to exceed 6%	Public		Yes, State and municipal	Yes		Additional bonds may be issued if a deficit
Okla.	Yes, may issue for any part, one or more or all projects	Not over 5%	Not over 40 years	Yes	Yes	For such price as authority determines is for the best interest of the State, but not so low as to require the payment of more than 5% interest	Either	No	Yes	Yes	Yes	Authority may apply to State supreme court for determination of validity of bonds and trust fund
Pa. (1), (2) & (3)	Yes	Not over 6%	Not over 40 years	Yes	Yes	Shall not be sold at a price so low as to require the payment of interest on money received therefore more than 6%, computed in accordance with standard tables of bond values	In such manner and for such price as commission may determine	No	Yes	Yes	Yes	
(4) thru (10)	Yes	Not over 6%	Not over 40 years	Yes	Yes	Same as above	Same as above	No	Yes	Yes	Yes	
(11)	Yes	Not over 6%	Not over 40 years	Yes	Yes	Same as above	Same as above	No	Yes	Yes	Yes	
R. I. (1)	Yes	Not over 6%	Not over 50 years	Yes	Yes	For such price as authority determines, but not for less than 97% of principal amount of bonds	Either	Only on Newport Bridge bonds	Yes	Yes	Yes, and for project improvements	Authority dissolved if no bonds issued by May 3, 1971

Table 4. State Toll Facilities Legislation Analysis: Financing (continued)

State (cont'd)	(B) Protection of Bondholders (13) Restrictions Re Mortgaging	(14) Assignment of Revenue from Bonds or Tolls	(15) Redress	(C) Revenue (16) Sinking Fund Provisions	(D) Financing of Preliminary Expenses (17) Maximum Amount	(18) Source	(E) Exemption of Property from Taxes (19)	(F) Special Provisions (20)
N. Y. (cont'd) (3)		Yes, tolls from Southern State Parkway and any other revenues	Yes					State covenants to prohibit competing facilities. Construction of additional parking facilities at Jones Beach costing $1-1/4 million authorized
(4)		Yes, any moneys or revenues, subject only to agreement pledging any particular tolls or revenues	Yes, including receivership	Yes	$550,000 appropriated		Yes	State covenants to limit competing facilities
(5)		Yes, may pledge tolls and revenues of bridge or ferry	Same as above	Bond resolution may provide for sinking funds	$550,000 appropriated	Legislative appropriation for capital construction fund, to be reimbursed		State pledges to limit competitive facilities and preserve rights of the authority. Directed all moneys be paid to State comptroller and paid out on his check
(6)		Yes, tolls and revenues	Same as above	Same as above	As allocated by director of budget	Advance from $15 million appropriation		State pledges to limit competing facilities and that it will not limit or alter rights of authority to prejudice of bondholders
Ohio (1)		Yes	Yes	Yes	None stated	Department of highway funds, as approved by commission; to be reimbursed	Yes	May issue bonds for any one or more turnpike projects
(2) & (3)	Yes	Yes	Yes	Yes				Bonds shall be signed by the governor
Okla.	Yes	Yes	Yes	Yes	$1,500 per mile	State highway commission funds expended with approval of authority	Yes, but concessions subject to county tax	Average amount spent by turnpike users on gasoline taxes calculated and formula devised whereby a corresponding amount, not over $1 million yearly, is turned over to authority to make up any deficit, on the condition that trust fund at no time exceed $4 million or an amount equal to 3 years interest on all turnpike bonds
Pa. (1), (2) & (3)	Yes	Yes, tolls and revenues	Yes	Yes			Yes	
(4) thru (10)	Yes	Yes	Yes	Yes	May borrow not exceeding total cost of turnpike	Issue turnpike noted or other revenue obligations of commonwealth at not over 6%, but faith and credit of commonwealth not pledged for their payment	Yes	Authorized to combine projects for financing
(11)	Shall not convey or mortgage parkway or part	Yes	Yes	Yes			Yes	
R. I. (1)	Yes	Yes, pledged to sinking fund	Yes	Disposition of sinking funds subject to provisions of bond resolution or trust agreement			Yes	May combine projects for financing. State covenants against competition

Table 5. State Toll Facilities Legislation Analysis: Miscellaneous (cont'd)

State	Policing	Authority of Local Units to Lease or Convey Real Property to an Authority Without Advertisement	Responsibility for Damage or Bodily Injury	Regulatory Power
Pa. (1) through (11)	Such force of police, toll-takers and other operating employees as the Commission may employ	Yes, and from all public agencies and commissions of Commonwealth, including public roads and other real property already devoted to public use	For property damage	
R. I. (1)	May contract with State Police		For damage to public facilities or from relocating any public way or place and from surveys	Fine to $100 and imprisonment to 30 days for failure to pay toll
Tex. (1)	Such police, toll-takers and other operating employees as Authority may employ; may agree with Department of Public Safety for its police officers	Yes	Private property damaged to be repaired or restored or compensation made	Fine to $100 for nonpayment of tolls with lien on and possession of vehicle until paid
Va. (1)	Such force of police, toll-takers and other operating employees as the Commission may employ	Yes	Directed private property damaged be repaired or restored or compensation made. Grade separation and highway vacation damage to be paid as cost of project	Fine to $1,000 and imprisonment to 1 year for interest in contract by member, agent or employee
(2)	Projects policed in whole or in part by officers of Department of State Police; all other State and local police to have same powers on as they have beyond project. Commission authorized to employ "project guards" to summon or arrest on view violators of rules and regulations, except those paralleling State law	Authorized to accept contributions of any thing of value from any public or private body	Public and private property damaged or destroyed to be restored or repaired or compensation made, and public way vacation or relocation damage paid	Violation of Commission rules and regulations a misdemeanor or punished as if committed on public road or street
(3)	Commission police and local police	Yes	For property damage	One hundred dollar fine; 30 days for failure to pay toll
(4)	State Police	Yes	Property damage	Violation of law or turnpike regulations a misdemeanor or punished as if on public street. One thousand dollar; one year for member, agent, or employee to be interested in contract
(5)	Authority police or State Police	Yes	Same as above	Same as above
Wash. (1)			Insurance or indemnity bonds as protection against any loss or damage, including loss or interruption of tolls, permitted	
(2)			Authority, and not State, subject to common carrier laws for loss or damage to property and injury or death to shippers and passengers. Injury or death to other persons limited to amount of insurance. Seamen permitted to sue authority for injuries, applying Federal law. Execution on judgment or attachment against authority property or maritime lien against vessels prohibited, but order of court may require authority to pay any judgment	
W. Va. (1)	By members of Department of Public Safety by agreement with and at cost of turnpike commission	Yes	For damage in changing location of any private road or public highway and from surveys. Directed private property damaged or destroyed be repaired or restored or compensation made	A misdemeanor for placing sign or other markings on any public road or highway punishable by fine from $25 to $100 each day. Evasion or attempted evasion of tolls, or aiding another therein, or intentional trespass on project a misdemeanor punished by fine not over $50
Wis. (1)	Motor vehicle laws declared applicable to turnpikes and they are deemed public highways for that purpose and not subject to any local traffic laws. Corporations authorized to hire persons, with approval of Governor, vested with powers of State traffic officers to enforce laws		Reimbursement directed for actual damage from surveys, from public utility line relocation, from grade separations and changes and compensation for use of State lands	Penalties as provided by law for class A highways

analysis of travel trends in Toronto, 1954-1964; a study of the factors in work-trip lengths; a discussion of the use of 1960 census data for urban transportation planning; and an investigation of the basic concepts and procedures used in transportation studies, e.g. land use, activity, and non-residential trip generation.

H-065

Highway Research Board.
ORIGIN AND DESTINATION: METHODS AND EVALUATION. Highway Research Record, no. 114. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966.

Contains ten papers, five discussions and other material dealing with applications and uses of origin-destination data, treating such subjects as trip generation evaluation, traffic assignments, trip distribution procedures, land-use models, transit and highway interactions, transit riders, etc.

H-066

Highway Research Board.
PLANNED COMMUNITIES. Highway Research Record, no. 97. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

Five reports covering: the role of the Federal Government in assisting in the development of sound urban growth through various techniques, one of which is the "planned community"; the advantages of planned communities and the relationships between transportation and land use that must be considered in shaping new urban growth patterns; planned communities, two of which are described in some detail: Columbia, Maryland and the Bluffs, a planned community on the Irvine Ranch, Newport Beach, California; European efforts in planning with Stockholm, Harlow, Cumbernauld, Tapiola, Rotterdam and Warsaw given as examples. One report has been abstracted and appears in the Bibliography under E-006.

H-067

Highway Research Board.
PLANNING IN HIGHWAY ADMINISTRATION. Highway Research Board Special Report 72. National Research Council. National Academy of Sciences, Washington, D.C., 1962.

The proceedings of a Conference held in March 1962 whose aim was to discuss planning for solving basic problems of State highway administrators, using the planning process for realignment of finances and improvement of administration, and to identify research needs that will improve planning functions. Topics included highway planning concepts, development and goals, needs, social, economic, and financial aspects of planning information, administration problem areas, utilization of information, and future trends. Some of the most pressing social, economic, and financial problems facing highway planners and administrators were discussed, and the types of information needed for their solution were described.

H-068

Highway Research Board.
PROGRAMING AND NEEDS 1963 AND 1964. Highway Research Record, no. 87. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

Six papers covering: computer-processing techniques for the concept that each alternative for improvement of a deficient highway section can be evaluated as an investment opportunity that can yield a specific rate of return in terms of congestion dollars; the testing of a priority formula for programming urban arterial street improvements; priority arrangements of programmed projects in allocating the fixed pool of classified manpower resources for a predetermined time interval; a computer program to determine what highway design standards can be provided with anticipated funds; a computer program in Minnesota for a continuing trunk highway needs study, designed for periodic revision to allow for changes in design criteria, traffic data, and cost factors without disrupting the basic information. One paper has been abstracted and appears in the Bibliography under M-005.

H-069

Highway Research Board.
ROAD USER CHARACTERISTICS. Highway Research Record, no. 122. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966.

Nine reports dealing with various road-user characteristics including the relation of individuals' driving records to visual acuity, and automatic system for vehicle control, recording of a driver's visual input, study (by simulation) of wrong-way driving on freeway off-ramps, drivers' attitudes toward alternative highways, changes in driver performance with time spent in driving, effects of fatigue on performance, and nighttime aspects of relative velocity detection by drivers.

H-070

Highway Research Board.
ROADSIDE DEVELOPMENT. In: Highway Research Record, No. 23. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963.

Fourteen reports cover a variety of topics including the role of the landscape engineer, highway location as a problem of urban and landscape design, landscape architects in highway organization, aesthetic factors in urban arterial highway planning, future roadside development, noise abatement, mulching, control of soil subject to wind erosion, turf management, sewage sludge as a mulch, photogrammetry and photographic interpretation in landscape development, turf mixtures for roadside seedings. One paper (on interstate system rest areas) has been abstracted and appears in the Bibliography under E-001.

H-071

Highway Research Board.
SELECTED PROBLEMS RELATING TO HIGHWAY LAWS. Highway Research Board Special Report 76. National Research Council. National Academy of Sciences, Washington, D.C., 1962.

A compilation of papers and discussions presented at a workshop on highway law, which

includes selected topics within the fields of highway legislation, condemnation procedure, inverse condemnation claims, tort liability, and contract administration. Research in highway legislation was emphasized, and many articles were followed by discussions.

H-072

Highway Research Board.
SHIFTING EMPHASIS IN TRANSPORTATION AND ITS IMPLICATIONS FOR RESEARCH. Highway Research Record, no. 183. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967.

Contains three reports on shifting emphases in transportation and federal government and coordinated transportation. Two of the papers have been abstracted and appear in this bibliography under L-003 and R-010.

H-073

Highway Research Board.
SHOPPING CENTERS AND PARKING. Highway Research Record, no. 130. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966.

Three papers are included. Two are concerned with parking and traffic requirements at large planned shopping centers, while the other is a study of fringe parking usage for transit riders, based on Washington D. C. studies. The paper on fringe parking usage focuses on the feasibility of extended use of parking facilities for transit users, and arrives at conclusions which could be influential in the success or failure of fringe parking in cities generally. The paper on shopping center parking requirements presents research derived from 270 centers throughout the U. S. and Canada and recommends appropriate standards for application to zoning ordinances for new centers. The third paper applies mathematical modeling to calculate maximum generation of traffic to planned shopping centers. The model derived used trips/sales ratios.

H-074

Highway Research Board.
SOIL MAPPING: METHODS AND APPLICATIONS. Highway Research Board Bulletin 299. National Research Council. National Academy of Sciences, Washington, D.C., 1961.

Nine papers. Subjects include the preparation of soil strip maps for state highway projects, the use of a pedologic map in a highway soil survey, the use of agricultural soil maps for highway engineering, the application of airphoto interpretive techniques, cooperative soil mapping projects, terrain mapping, use of geologic strip maps in highway location and design, a technique for soil mapping, and a state engineering soil study. States represented are: Michigan, Illinois, Nebraska, Maine, Indiana, New York, Massachusetts, Rhode Island, and Maryland.

H-075

Highway Research Board.
STATE HIGHWAY ADMINISTRATION ORGANIZATIONS; AN ANALYSIS. Highway Research Board Special Report 51. National Research Council. National Academy of Sciences, Washington, D.C., 1959.

After a brief historical survey, the type of administration (single executive, commission, or mixed) is given as found in the 48 states (Alaska and Hawaii did not have such at the time). The advantages and disadvantages of the several types are discussed. The method of selection (election, appointment by the governor) is given by states, and the geographic representation (for commissions) and other qualifications are summarized. An appendix lists in tabular form the name of the state, the date the department was created, its title, the composition, term of office and salary of the top administration, and data regarding the chief administrative officers. Material for Pennsylvania is reproduced on page 101.

H-076

Highway Research Board.
STATISTICAL AND MATHEMATICAL ASPECTS OF TRAFFIC. Highway Research Record, no. 118. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966.

Six papers devoted to statistical and mathematical considerations of traffic: ramp capacity, better movement of traffic through traffic signals, driver performance at stop-controlled intersections, fundamentals of driver decisions at intersections, and uses of computers to simulate driver behavior at intersections.

H-077

Highway Research Board.
STUDIES IN HIGHWAY ENGINEERING ECONOMY. Highway Research Board Bulletin 320. National Research Council. National Academy of Sciences, Washington, D.C., 1962.

Four papers are presented on: comparisons of simulation methods with customary user-cost analyses of vehicle operating costs; estimating benefits and costs of secondary road improvement; total annual cost measurements; most-economic design procedures as applied to bridges and roadways crossing flood plains. One paper has been abstracted and appears in the bibliography under O-003.

H-078

Highway Research Board.
TOP ISSUES IN URBAN RESEARCH 1963. Highway Research Record, no. 64. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963.

Four reports dealing with costs of urban transport systems, system configurations, levels of data collection, and characteristics of intercity travel. All have been abstracted and appear in this bibliography under C-015, H-006, L-016, and W-016.

State	Date first department was created	Title of department or commission	Top administrative organization			Chief administrative and executive officers					
			Composition	Term of office	Salary	Chief administrative officer	Term of office	Assistant chief administrative officer	Term of office	Chief engineering officer	Term of office
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
Oklahoma	1911	State Highway Department	Commission - 8 Members: Appointed by the Governor, subject to senate confirmation, one from each of eight congressional districts, as existed January 27, 1947, to be citizens and residents thereof for at least three years prior to appointment. The commission elects a chairman, a vice-chairman, and a secretary from among its members. The Governor is an ex officio member of the commission, but votes only in case of a tie.	8-year staggered terms, two expiring every two years on February 15. Removal by the Governor at his pleasure.	1/ $3,600	State Highway Director: Elected by a majority vote of the entire commission, and shall be a qualified and competent engineer.	At the pleasure of the commission.	Assistant Director: State highway engineer serves in this capacity by appointment of commission.	At the pleasure of the commission.	State Highway Engineer. Appointed by the director, who determines his qualifications and prescribes his duties.	At the pleasure of the director.
Oregon	1913	State Highway Commission	Commission - 3 Members: Appointed by the Governor, not more than one from any congressional district, and in case of a vacancy for any cause the new member must be appointed from the same congressional district as the one in which the vacancy occurs. The commission selects one of its members as chairman.	3-year staggered terms, one expiring each March 31.	Actual traveling and other necessary expenses.	State Highway Engineer: Appointed by the commission, and shall be a competent civil engineer, qualified by technical training as well as by practical experience in highway engineering.	At the pleasure of the commission, but not in excess of four years without reappointment.	Deputy State Highway Engineer: Appointed by the commission, in keeping with the competitive provisions of the State civil service, and shall be a competent civil engineer qualified by technical as well as by practical experience in highway engineering.	At the pleasure of the commission.	State Highway Engineer.	See column (8).
Pennsylvania	1903	Department of Highways	Secretary of Highways: Nominated and, by and with the advice and consent of two thirds of all members of the senate, appointed by the Governor. Serves full time and is also a member of the Governor's cabinet.	4 years, from the third Tuesday of January next following the election of Governor and until a successor is appointed and qualified. Serves at the pleasure of the Governor.	$20,000	The Secretary of Highways	See column (5).	Chief Deputy Secretary: Appointed by the secretary with the approval of the Governor.	No specific term.	Deputy Secretary for Engineering: Appointed by the secretary with the approval of the Governor. Shall be especially qualified for his position by training and experience in the particular kind of work which his duties will require him to perform.	No specific term.
Rhode Island	1896	Department of Public Works, Division of Roads and Bridges.	Director of Public Works: Appointed biennially by the Governor, subject to senate confirmation or rejection within three days after notification.	2 years, at the pleasure of the Governor. Serves until a successor is duly appointed and qualified.	$12,500	The Director of Public Works.	See column (5).	Deputy Director of Public Works: Is in the classified civil service and is appointed through competitive examination.	Indefinite, subject to the civil service laws.	Chief Engineer: Is in the classified civil service and is appointed through competitive examination.	Indefinite, subject to the civil service laws.
South Carolina	1917	State Highway Department	Commission - 14 Members: Elected from the judicial circuits of the State which are constituted and created highway districts, one from each district, by majority vote of the legislative delegations representing said districts. Representation of a given highway district on the commission shall be rotated among the counties of the district except by unanimous consent of all members of the legislative delegation from the district. Commission selects its own chairman.	4-year staggered terms, expiring on April 15 of the appropriate year, or until a successor shall have been elected and qualified.	$100 per year. 1/	Chief Highway Commissioner: Appointed by the commission to serve as administrative and executive head, with authority to act for the commission when not in session. Shall be a citizen of practical and successful business and executive ability.	4 years. The right to remove or discharge holder of this position is reserved to the commission.			State Highway Engineer: Appointed by the commission, and shall be a competent engineer, skilled and experienced in highway planning, design, construction and maintenance, and shall be an engineering graduate of a college or university with an accredited course in engineering. Selection may be by civil service examination under rules and regulations of the commission.	At the discretion of the commission.
South Dakota	1913	Department of Highways	Commission - 4 Members: Consisting of the Governor, who shall be ex officio chairman, and three commissioners, appointed by the Governor, who shall be competent authorities on road building and devote their entire time to the administration of the business of the highway department.	4 years, but any commissioner may be removed from office by the Governor at his discretion.	1/ $3,000	Director of Highways: Appointed by the commission, to be the principal executive and administrative officer of the department and also secretary of the commission.	4 years, unless sooner removed for cause.			State Highway Engineer: Appointed by the commission, and shall be a graduate engineer registered in the State as a professional engineer and land surveyor.	At the pleasure of the commission.

H-079

Highway Research Board.
TRAFFIC CONGESTION AS A FACTOR IN ROAD-USER TAXATION. Highway Research Record, no. 47. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964.

Contains six articles on: the relation between optimum congestion tolls and present highway user charges; theory of spillover cost pricing; investment in two-mode transportation systems; theory of efficiency tolls; congestion tolls; principles of urban transportation pricing.

H-080

Highway Research Board.
TRAFFIC CONTROL: DEVICES AND DELINEATION. Highway Research Record, no. 105. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966.

Seven papers dealing with the problem of using traffic control devices to guide driver and the role of medians in providing traffic seperation and delineation. Five of the papers are by state highway department authors and reflect research undertaken with the aid of their departments.

H-081

Highway Research Board.
TRAFFIC FLOW CHARACTERISTICS 1963 and 1964. Highway Research Record, no. 72. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

Contains seven reports on different aspects of traffic flow including the complexities of analysis of speeds, a mathematical model for simulating traffic flow characteristics and the geometric parameters, effects of changes in highway operation, and a method for estimating present and future traffic volume when few data are available. One of the papers has been abstracted and appears in the bibliography under W-020.

H-082

Highway Research Board.
TRAFFIC FLOW THEORY. Highway Research Record, no. 89. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

Three reports, concerned with the theoretical aspects of operating a freeway control system in peak periods, the use of traffic simulation to determine the delay and the fuel consumption of vehicles at intersections, and the "spillback" that results from queueing on ramps.

H-083

Highway Research Board.
TRAFFIC ORIGIN-AND-DESTINATION STUDIES; APPRAISAL OF METHODS.
Highway Research Board Bulletin 253. National Research Council
National Academy of Sciences, Washington, D.C., 1960.

Papers dealing with: estimation of efficient spacing for expressways and arterial highways; trip generation within the central business district; tests of interactance formulas derived from origin-destination data; interpretation of desire line charts made on a cartagraphatron; keeping origin and destination data current; sample size; land use forecasting for transportation planning; the New York Port Authority's survey employing continuous origin-destination sampling; a theoretical prediction of work-trip patterns; a critique of home-interview type origin-destination surveys. There is also a panel discussion on inter-area travel formulas. One of the articles has been abstracted and appears in the Bibliography under L-024.

H-084

Highway Research Board.
TRANSPORTATION AND ECONOMIC DEVELOPMENT. Highway Research Record, no. 115. Highway Research Board. National Research Council, National Academy of Sciences, Washington, D.C., 1966.

H-085

Highway Research Board.
TRANSPORTATION SYSTEM ANALYSIS AND EVALUATION OF ALTERNATE PLANS.
Highway Research Record, no. 180. Highway Research Board.
National Research Council. National Academy of Sciences,
Washington, D.C., 1967.

Nine reports concerning transportation system analysis on: the methodology used to evaluate alternative alignments for a Chicago expressway, the efficacy of traditional cost-benefit methodology, transportation implication of alternative sketch plans, a decision-making technique for transportation planning, design conceptualization and evaluation of the indirect impacts of alternative Northeast Corridor transportation systems, the preliminary engineering economy analysis of 5 alternative urban transportation systems, and the economic evaluation of investments in agricultural penetration roads in developing countries. Three of these papers have been abstracted and appear in the Bibliography under H-090, J-002, and M-007.

H-086

Highway Research Board.
TRANSPORTATION SYSTEM EVALUATION. Highway Research Record,
no. 148. Highway Research Board. National Research Council.
National Academy of Sciences, Washington, D.C., 1966.

Five papers dealing with: development of transportation system alternates, criteria for evaluating alternates, application of linear programming to optimization of a radial transportation network, effective use of computers for transportation problem-solving, and a methodology for evaluating costs and benefits of alternative urban transportation systems.

H-087

Highway Research Board.
TRAVEL PATTERNS. Highway Research Record, no. 88. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

Eight reports on the use of the gravity model, modal split procedures, traffic assignment techniques, procedures for determining travel patterns, a method for estimating potential increases in traffic volumes, and a review of existing land-use forecasting techniques. Three of these reports have been abstracted and appear in the Bibliography under B-030, S-013 and S-023.

H-088

Highway Research Board.
URBAN TRANSPORTATION: DEMAND AND COORDINATION. Highway Research Board Bulletin 326. National Research Council. National Academy of Sciences, Washington, D.C., 1962.

Five papers covering: basic relationships between people, cities, and their transportation requirements; trends in travel and in urban development; rationale for predicting travel modes in urban areas; the characteristics of public and private transportation as related to various predictors and the interrelationships between the above; the experience in the Chicago metropolitan area which has disclosed elements previously not dealt with adequately in urban transportation planning; a method for getting realistic local highway plans. Two papers have been abstracted and appear in the bibliography under M-020 and W-017.

H-089

Highway Research Board.
URBAN TRANSPORTATION PLANNING TECHNIQUES AND CONCEPTS. Highway Research Record, no. 102. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

The papers contained in this record are concerned with various administrative concepts, mathematical models, and other planning concepts directly related to the urban transportation process including politics and administration, community values, multiple regression models of small-area population change, metropolitan airport systems, automobiles and buses in the core, underground highways and parking facilities. Three papers from this report have been abstracted and are listed in the Bibliography under H-005, L-001 and L-009.

H-090

Hill, Morris.
A METHOD FOR THE EVALUATION OF TRANSPORTATION PLANS. In: Transportation System Analysis and Evaluation of Alternate Plans. Highway Research Record, no. 180. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967, pp. 21-34.

"Goal-achievement analysis," a plan evaluation method which allows analysis of mul-

tiple objectives for a single system, is described. A transportation goal-hierarchy is presented. Transportation ideals, objectives, policies and requisites are proposed. By determining how various objectives will be affected by proposed plans, the goals-achievement matrix can determine the extent to which certain specified standards are being met. Objectives must be weighted. To illustrate the analysis method, three of the postulated transportation objectives are examined: reduction of accident rate, reduction of community disruption, and reduction of air pollution.

H-091

Hitchcock Publishing Company.
HITCHCOCK'S MASS TRANSPORTATION DIRECTORY. Hitchcock Publishing Company, Wheaton, Illinois, 1959-1960 edition.

A directory of the manufacturers and suppliers serving the mass transportation industry, the industry itself, and a list of industry associations; and operating, capacity, and investment data on the companies which operate city, suburban and intercity buses, passenger railroads, and passenger airlines in North America. The section on National and Regional Associations includes the addresses and officer lists of those organizations which are allied with the transportation industry.

H-092

Hodgkins, E. A.
EFFECT OF BUSES ON FREEWAY CAPACITY. In: Freeway Operations. Highway Research Record, no. 59. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964, pp. 66-82.

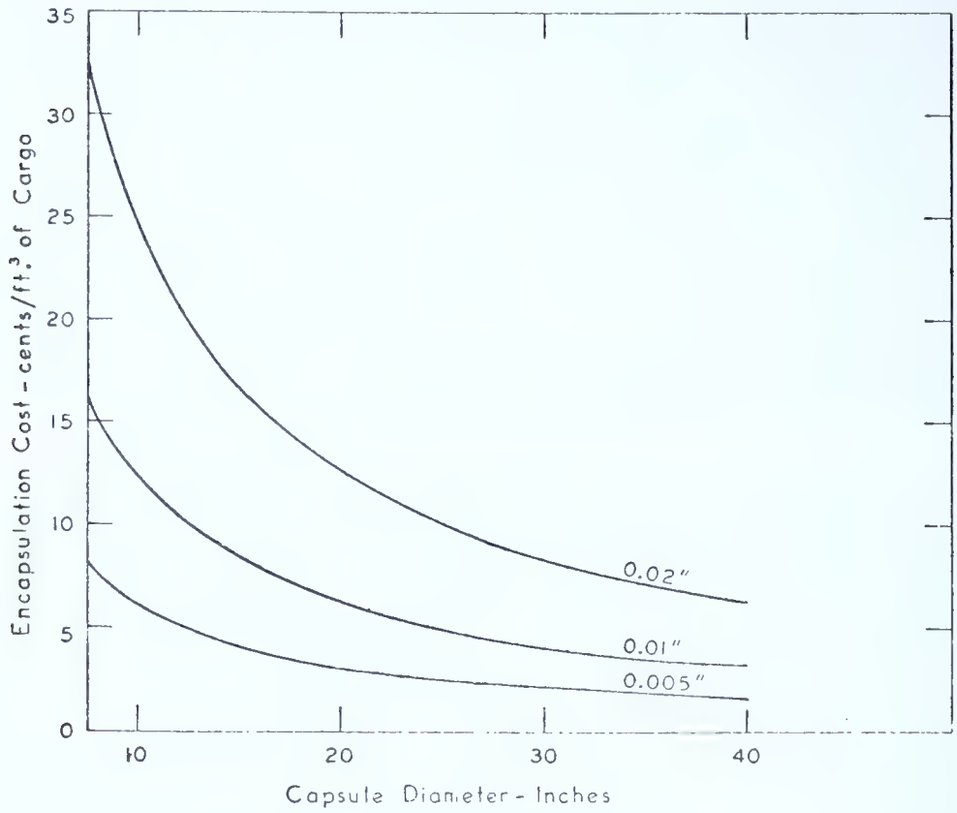
A study was conducted to measure speeds and spacing between buses on freeways and similar facilities, where several buses form a continuous group at relatively frequent intervals during peak periods. The passenger car equivalent to the buses on such roads was also determined. The study was designed to determine the theoretical maximum volumes within a specified speed range. Volumes were computed for level, tangent sections of freeway with 12 ft. lane widths and no lateral restrictions. The effects of freeway interchanges, grades, ramps and ramp spacing were not considered.

H-093

Hodgson, G. W. and L. H. Bolt.
PIPELINE FLOW OF CAPSULES; POTENTIAL INDUSTRIAL APPLICATIONS. Engineering Journal, vol. 45, Dec. 1962, pp. 25-30.

Capsule pipelining namely moving large coherent segments as a part of a flowing stream, is examined. The basic science is discussed briefly and the economics of the process are explored in detail. Additional costs for piping, pumping stations, operating expenses, due to the reduced loading factor in this system, are examined. Costs and technology of encapsulation, the major cost item of the system, are also discussed. They were found to vary inversely with capsule diameter as shown in the chart on page 106. Possible applications are explored; these include shipping grain, minerals, chemical products, and forest products.

Fig. 4. Cost of encapsulation per cu. ft. of cargo as a function of capsule scale-up over a range of capsule diameters and various plastic film thicknesses when the capsule length equals five capsule diameters, based on a disposable film costing about 50 cents/lb. in place.



H-094

Hoel, L. A.
CONSIDERATIONS AFFECTING THE CHOICE OF URBAN TRANSPORTATION SYSTEMS. Traffic Engineering, vol. 37, May 1967, pp. 36-84.

H-095

Hoel, L. A.
TRUCK TRAVEL IN LOS ANGELES METROPOLITAN AREA. Traffic Quarterly, vol. 18, no. 4, Oct. 1964, pp. 535-53.

Aspects of truck travel based on internal origin-destination surveys completed in connection with Los Angeles Regional Transportation Study are presented. The paper describes design and quality of both surveys, discusses some characteristics of truck travel which were observed in comparing two truck populations, and presents some aspects of commodity movement by truck.

H-096

Hogan, W. J.
OPERATING COST OBJECTIVES OF V/STOL AIRCRAFT FOR COMMERCIAL AIRLINE SERVICE. SAE-Paper 650243 for meeting Apr. 12-15, 1965, 6 pp.

V/STOL aircraft may offer a potential solution to the short-haul losses of commercial

airlines. Operational and economic characteristics desirable in V/STOL aircraft, designed for commercial service over routes of 150 mi or less, are examined. Current helicopter cost experience is analyzed and the results of simulation of helicopter operations over typical short-haul truck line route are reported. V/STOL cost trends are compared with comparable cost trends of fixed-wing aircraft in short-haul commercial service. The economic requirements are discussed and sensitivity of V/STOL costs to changes in various cost determinants is analyzed.

H-097

Holmes, E. H.
HIGHWAY TRANSPORTATION. In: U.S. Transportation: Resources, Performance and Problems. A collection of papers prepared for the Transportation Research Conference convened by the National Academy of Sciences at Woods Hole, Massachusetts, August 1960. National Research Council. National Academy of Sciences, Washington, D.C., 1961. Publication 841-S., pp. 3-86.

The following aspects of highway transportation are discussed and statistics presented: the physical plant, including motor-vehicle production and registrations, highway mileage and systems, and land use; transport functions, including highway expenditures, motor-vehicle ownership and use, traffic speed trends, cyclical traffic patterns, bus transportation, urban traffic, federal aid for highways, capital investment, costs of owning and operating an automobile, and costs of owning and operating highways; operation and administration of highways including political aspects and employment levels; forecasts for movements over highways, including line-haul trucking problem areas of safety, planning, design, construction, maintenance, and traffic operations.

H-098

Holshouser, E. C.
ACCOUNTING AND BUDGETING REQUIREMENTS FOR ADVANCE CONSTRUCTION PROGRAMS. In: Forumulating Highway Construction Programs. Highway Research Board Special Report 62. Workshop Conference Proceedings, September 19-20, 1960. National Research Council. National Academy of Sciences, Washington, D.C., 1961. pp. 57-62.

A description of the development of a reasonable firm, long-range highway construction program in Kentucky, and the control of the program through the use of electronic data processing equipment. A comprehensive construction budget was first initiated in 1958 and information was programmed into a computer not being fully utilized. The status of each project in terms both of money spent and of technical progress was continuously available to the executives responsible for the program. A list of the things needed for proper administration included a firm, priority-based road-building program, adequate coordination between the budget and the schedules staff, a standard for processing certain checks, more careful attention to details to prevent delay in payment of right-of-way vouchers, accounting records of Federal aid, and a revision of the right-of-way procedure to prevent tying-up money unnecessarily.

H-099

Holzhauser, C. A. et al.
DESIGN AND OPERATING CONSIDERATION OF COMMERCIAL STOL TRANSPORTS. J. of Aircraft, vol. 2, no. 2, Mar.-Apr. 1965, pp. 87-93.

The use of STOL aircraft for commercial short-haul transportation system is studied. The design, operating characteristics, and costs are examined and compared to conventional aircraft. The reasons for providing short-haul transports with STOL capability are: the increase in the number of airfields from which aircraft can be operated and the increase in safety and/or reduction in instrument flight rules minimums.

H-100

Homburger, W. S. and W. R. Eager
AUTOMOBILE PARKING REQUIREMENTS AT AIRPORTS. ASCE Proceedings, vol. 90, (J. Aero-Space Transport Division), no. AT2, Oct. 1964, paper 4078, pp. 141-159.

It is emphasized that the concepts, criteria, and operating methods for airport garages must be different from business-area parking garages, and that consideration must be given to automated passenger, baggage, and automobile handling.

H-101

Horn, J. W. et al.
EXAMINATION AND COMPARISON OF ADT GRAVITY MODELS. Final Report, Project ERD-110-X, Engineering Research Department, North Carolina State University, Raleigh, N.C., June 1966, 161pp.

The background, research methods, analysis and results of a study correlating a synthetic trip distribution technique with a comprehensive home-interview and destination survey are presented. The specific aims of this research were to investigate the effects of reducing home-interview sample size on a gravity model distribution procedure, to investigate different methods of predicting trip productions and attractions, and to study the effects of using these predicted values on a gravity model. The results are presented in tabular form. It is concluded that the smallest sample which produces acceptable results is 400 useable interviews.

H-102

Horn, K. William.
AIR CARGO TON-MILES -- A STATISTIC OF GROWING IMPORTANCE. In: Freight Transportation. Highway Research Record, no. 82. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 94-99.

Reporting procedures by the airline industry to the CAB and the growth of cargo traffic during recent years are described and shown in the appended Table 1. The airlines carried less than 0.1% of the total inter-city ton-miles in 1963, but this cargo is of high value, consisting of mail and express. They are expected to triple

their volume by 1975. As air freight tonnage grows, more detailed reporting procedures will be required and eventually tonnage and ton-mile figures by commodity groups will be developed as in the other means of transport.

TABLE 1

DOMESTIC INTERCITY FREIGHT BY MODES[a]

Year	Tons-Miles (billions)						
	Air[b]	Rail	Truck	Oil Pipeline	Great Lakes	Rivers and Canals	Total
1939	0.01	339	53	56	76	20	544
1940	0.02	379	62	59	96	22	[illegible]
1941	0.02	482	81	68	114	27	772
1942	0.04	645	60	75	122	26	928
1943	0.05	735	57	96	115	26	[illegible]
1944	0.07	747	58	133	119	41	[illegible]
1945	0.09	691	67	127	113	30	1,028
1946	0.08	602	82	96	96	28	904
1947	0.11	665	102	105	112	35	1,019
1948	0.15	647	116	120	119	43	1,045
1949	0.20	535	127	115	98	42	917
1950	0.30	597	173	129	112	52	1,063
1951	0.34	655	188	152	120	62	1,177
1952	0.34	623	195	158	105	64	1,145
1953	0.37	614	217	170	127	75	1,203
1954	0.38	557	213	179	91	83	1,123
1955	0.49	631	223	203	119	98	1,274
1956	0.58	656	249	230	111	109	1,356
1957	0.68	626	254	223	117	115	1,336
1958	0.70	559	256	211	80	109	1,216
1959	0.80	582	289	227	80	117	[illegible]
1960	0.89	579	299	229	100	123	[illegible]
1961	1.0	570	313	233	87	124	1,326
1962	1.3	600	331	238	90	133	[illegible]
1963	1.3	629	348	243	97	143	[illegible]

[a]Includes mail and express but not intercoastal and coastwise ton-miles; based on data from the Transportation Association of America, Interstate Commerce Commission, and Civil Aeronautics Board.

[b]Includes domestic scheduled and charter service of the U.S. scheduled airline industry, both passenger-cargo and all-cargo carriers, and the supplemental airlines.

H-103

Horonjeff, R. and G. Ahlborn
JET TRANSPORTS CHARACTERISTICS RELATED TO AIRPORTS. ASCE Proceedings, vol. 91, (J. Aero-Space Transport Division), no. AT1, Apr. 1965, paper 4301, pp. 33-46.

Changes that have taken place in design of jet transports since they first went into service are examined, particularly with regard to their effect on airports. Major factors are runway length, noise, and geometry of taxiways. The effect of higher powered engines, improvements in the fitting capacity of wing, temperature, and runway gradient on runway length are shown and illustrated with examples. A procedure for determining the radius of curvature of taxiways is suggested.

H-104

Horstman, W. L.
BARGE DOCKS FOR INLAND WATERWAYS. ASCE-Proceedings, vol. 90, (J. Waterways & Harbors Division), no. WW4, Nov. 1964, pt. 1, paper 4146, pp. 99-126.

The design of barge docks used for moving bulk materials to and from land facilities is discussed. The economics of available types of construction are compared, taking into account river bottom conditions, river level fluctuations, and availability of natural materials. Governmental functions in the control of river operating conditions by a system of locks and dams are reviewed as they affect dock design and operation. Consideration is given to the design of mooring and fendering devices, barge shifters, and mooring hardware.

H-105

Horton, Thomas R., ed.
TRAFFIC CONTROL: THEORY AND INSTRUMENTATION. Plenum Press, New York, 1965.

A collection of papers and articles on the experience gained in several existing systems, and discussion of the instrumentation employed in or required for these various approaches. It is divided into three sections: introduction; traffic control instrumentation, theory and practice, which includes mathematical models, computer programming, and simulation; and case studies of large-scale integrated traffic control systems.

H-106

Horwood, Edgar M.
COMMUNITY CONSEQUENCES OF HIGHWAY IMPROVEMENT; DISCUSSION. In: Indirect Effects of Highway Location and Improvements. Highway Research Record, no. 96. Highway Research Board. National Research Council. National Academy of Sciences Washington, D.C., 1965, pp. 1-7.

A very brief summary of a study which evaluates existing studies of highway economic impact and other community consequences. It is stated that there are gaps in: knowledge of the specialized impacts of highways; refined methodological approaches to impact research; and miscellaneous areas of analysis in the domain of operational problems of highway agencies. Proposed areas of future community-consequences research are: spatially localized and integrated studies; and theoretically oriented models. The author concludes that there is a continuing need for operational studies and for a research program of spatially integrated studies.

H-107

Horwood, Edgar M., C. A. Zellner and R. L. Ludwig.
COMMUNITY CONSEQUENCES OF HIGHWAY IMPROVEMENT. National Cooperative Highway Research Program Report 18. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965.

Guidelines for highway agencies to follow in considering community consequences of highway improvements are developed through consideration of various types of economic impact studies classified by primary purpose of the highway facility. Averages and range of values for parameters studied in bypass, circumferential, and partially limited access highways in large urban areas studies are given, with a critique on the methods used. State highway departments were surveyed in order to examine the utility of studies conducted to date and to indicate gaps in knowledge in the area of highway impact analysis. Brief descriptions of three specific studies which reflect new approaches are given. This is the first of five volumes contained within this report, the other four being available on loan from the Highway Research Board. The second covers in detail special studies conducted to go beyond the limits of present available literature, the third, fourth and fifth cover respectively the Automated Indexing System, which has possible value in other aspects of highway research and contains 600 annotated references on this topic, and the Automated Indexes. These are considered to be useful to persons conducting research in the area of nonuser benefits.

H-108

Hosea, Harold R.
THE INTERCITY MOTOR BUS INDUSTRY. In: U.S. Transportation: Resources, Performance and Problems. A collection of papers prepared for the Transportation Research Conference convened by the National Academy of Sciences at Woods Hole, Massachusetts, Aug. 1960. National Research Council. National Academy of Sciences, Washington, D.C., 1961. Publication 841-S., pp. 97-105.

After a historical survey the author surveys current operations: in 1957 there were 19,259 intercity buses operated for 1.291 billion miles. The physical plant, the services rendered, the personnel, research and engineering, the capital invested and the distribution of the revenue dollar are discussed in the light of the most recent available information. The industry potentials and problems (rates, regulation, safety, national emergencies, statistical problems) are reviewed. The author is Director of Research, National Association of Motor Bus Owners.

H-109

Howe, C. W.
METHODS FOR EQUIPMENT SELECTION AND BENEFIT EVALUATION IN INLAND WATERWAY TRANSPORTATION. Am. Geophysical Union. Water Resources Research, vol. 1, no. 1, First Quarter 1965, pp. 25-39.

The determination of the optimal scale of waterway projects in terms of length, depth, and width and the selection by private operators of the best equipment (boats, barges, and their configuration) to be used on particular waterways are covered. The functional relationships are provided that permit prior evaluation of the effects of waterway scale variables on the ton-mile costs of cargo transportation.

H-110
Hutchinson, John W. and T. W. Kennedy.
USE OF ACCIDENT RECORDS IN HIGHWAY RESEARCH. Highway Research News, no. 13. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., June 1964, pp. 1-8.

A study was made of the accuracy and completeness of accident reporting to determine whether or not existing accident records could be used in evaluating the past performance of the various types of highway medians now in service in Illinois. Current accident reports were compared with the results of a detailed field investigation of the evidence at the sites of all reported and unreported accidents involving the median. There were great variations in the percentage of median encroachments. It was concluded that existing accident records would be of little use in evaluating the past performance of the various types of medians now in service.

I-001

Illinois University. Engineering Experiment Station.
TRAFFIC LINKAGE PATTERNS BETWEEN A METROPOLITAN AREA AND THE COMMUNITIES WITHIN ITS REGION OF INFLUENCE. University of Illinois. Engineering Experiment Station Bulletin, no. 488. Urbana, Ill., 1966.

Data from the 1958 Champaign-Urbana metropolitan area traffic study are used to portray patterns of inter-community travel which can be used as the basis for the development of inter-community traffic models. Factors discussed include spatial distribution of regional travel, volume or traffic interaction, and degree of central city dominance as expressed by trip generation. These items are investigated by total as well as by individual trip prupose categories. This area's influence for the generation of regional traffic was found to be of constant size and dependent upon the distance of other competing cities.

I-002

Institution of Mechanical Engineers, London.
TRANSPORT IN THE YEAR A.D. 2000. Automobile Division. Institution of Mechanical Engineers, London, England, 1965.

I-003

Irick, P. E. and W. N. Carey, Jr.
THE NEW HIGHWAY RESEARCH INFORMATION SERVICE. In: Highway Research News, no. 18. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., March 1965, pp. 5-15.

A description of a new automated storage and retrieval system called the Highway Research Information Service. A general flow chart is given in one figure and the coverage and selection of highway research information in another. A Thesaurus and index terms are being developed.

J-001

James, T.
TO THE AIRPORT - BY RAIL. Transport Age, March 1965, pp. 17-19.

J-002

Jessiman, William et al.
A RATIONAL DECISION-MAKING TECHNIQUE FOR TRANSPORTATION PLANNING. In: Transportation System Analysis and Evaluation of Alternate Plans. Highway Research Record, no. 180. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D. C., 1967, pp. 71-80.

A technique is presented which treats all pertinent factors of a decision-making problem systematically. The benefits and costs not easily measured in monetary units can be considered simultaneously with those which can be estimated in dollars and cents. The technique involves itemizing the objectives of a project, defining the best measure for each objective, weighting the objectives, evaluating the way each alternative plan meets each objective, and selecting the best alternative. These steps are explained and illustrated using a transit situation as an example. An extension of the technique is presented which makes it feasible to consider system of possible projects and the optimal allocation of available capital among them. This extension results in a problem which may be solved by integer linear programming techniques. The formulation of this linear programming technique is shown.

J-003

Johnson, J. W. and E. M. Kovitch.
FREIGHT CAR DISTRIBUTION-NATURE OF PROBLEM. Canadian Operational Research Society-J., vol. 1. no. 1, Dec. 1963, pp. 27-38.

A study of problems associated with information gathering, analysis and forecasting, planning inventory levels, calculation of car requirements, implementation of movement orders, and evaluation and control of performance was conducted to reduce inventory fluctuations in freight car operations. The problem is resolved by separating operating and planning functions. Problems in designing a control system are covered. A figure illustrating the dynamic instability of the supply process is shown on page 114.

J-004

Johnson, N. L.
FORECASTING AIRPORT TRAFFIC. ASCE Proceedings, vol. 90, (J. Aero-Spcae Transport Division), no. AT2, Oct. 1964, paper 4079, pp. 181-195.

New terminal facilities should be designed to meet "average peak demand" at their physical half-life. A forecast of air traffic is made by the Market Analysis Method which is found to be an improvement over extrapolations of past traffic and other systems of prediction. Using this method, predictions are made of probable demands to be made on Newark (NJ) Airport in 1975.

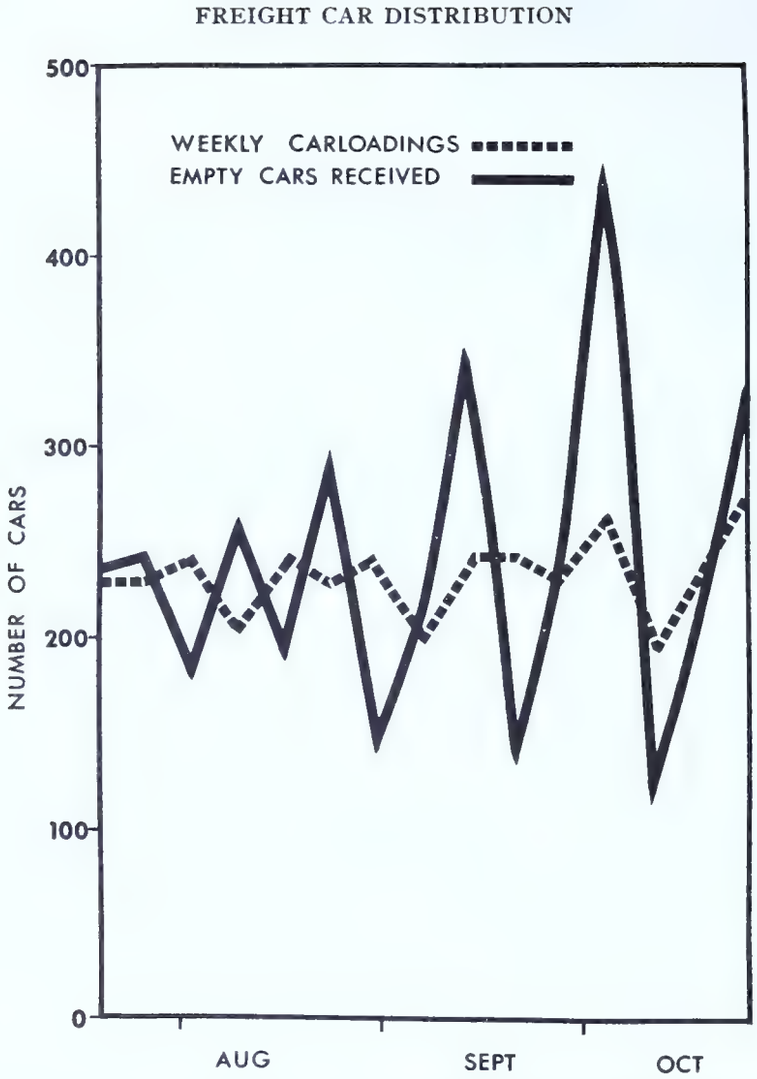


FIG. 2. Cars loaded and empty cars received weekly at a loading point. The figure illustrates the dynamic instability of the supply process.

J-005

Jones, William K.
CASES AND MATERIALS ON REGULATED INDUSTRIES.
Foundation Press, Brooklyn, N.Y., 1967.

J-006

Jorgensen, R.E.
PROGRAMMING HIGHWAY ACCIDENT REDUCTION. In: Highway Economics, Highway Research Record, no. 12. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963, pp. 112-123.

Highway accidents were analyzed in a study of the highway needs and planning in Kansas, South Dakota and Kentucky. All three had long-range plans for raising the service adequacy of their roads and streets. Kansas and South Dakota produced patterns supporting the conclusions that accidents are reduced in all traffic volume groups by improving highways and that accident rates increase as traffic volume increases. Relationships between types of accidents and road adequacy are given. Considerable increases in safety were found to be associated with increases in the adequacy level of rural state highways.

J-007

Jorgensen, Roy E.
DEFICIENCIES OF URBAN TRANSPORTATION STUDIES. ASCE Proceedings, vol. 91, (J. of the Highway Division), no. HW2, Dec. 1965, paper 4568, pp. 17-25.

The variety of methods being used in different urban transportation studies to answer problems of traffic generation rates and distribution factors makes it difficult to reach conclusions on present technical deficiencies. The lack of standardization as to basic approaches is in itself a deficiency. Technical deficiencies center around inability to accurately forecast land-use and inadequate data systems. Current data is a primary concern of the continuing planning process. Effective organization is critical in some places, as is the lack of trained personnel. Obtaining effective intergovernmental cooperation is still a problem with respect to getting studies initially organized, and making provision for continuous planning.

J-008

Jorgensen, Roy and Associates and Westat Research Analysts, Inc.
EVALUATION OF CRITERIA FOR SAFETY IMPROVEMENTS OF THE HIGHWAY. Roy Jorgensen and Associates and Westat Research Analysis, Inc., (P.O. Box 575, Gaithersburg, Md.) 1966. 227 pp.

The need for and the importance of a scientific approach to the programming of highway safety improvements was established by this study. Obviously, highway improvements cannot eliminate all accidents, for many other factors are involved policing, traffic court administration, driver licensing and other essential safety functions as well as the uncontrollable nature of the individual driver. Substantial accident reduction can be brought about in specific situations by identifying locations and sections of highway that meet a predetermined definition of "hazardous," and then by directing improvements toward these situations. In no other way can safety improvements produce results that will justify the required expenditure of always-limited highway dollars.

K-001

Kanwit, Edmond L. and D. M. Glancy.
USE OF METROPOLITAN AREA CENSUS DATA FOR TRANSPORTATION PLANNING. In: Economic Forecasting. Highway Research Record, no. 106. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966, pp. 22-43.

Shows how information on automobile availability and workers' commuting patterns, obtained from the 1960 Census of Population, can be applied in making some of the forecasts needed for sound urban transportation planning. Six characteristics relating to population, employment, and income, the major factors in traffic generation, are used for forecasts of present and future needs for transportation facilities.

K-002

Keefer, Louis E.

URBAN TRAVEL PATTERNS FOR AIRPORTS, SHOPPING CENTERS, AND INDUSTRIAL PLANTS. National Cooperative Highway Research Program Report 24. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966.

The development of airports, shopping centers, industrial plants, and other large generators of urban travel increases traffic volumes and changes traffic patterns on the street networks. The objective of this study was to evaluate the nature of the relationship between the travel patterns and factors such as: travel time characteristics, time distribution characteristics, characteristics of the traffic generator, modes of travel of the generated traffic, competition of similar generators for the same street network, socio-economic characteristics of the area, size, density and degree of development of the area. Airports, serving a large number of workers and visitors in addition to air travelers, can be among the largest single-site trip generators. Metropolitan area residents rely heavily on the automobile to get to the airport. Residents' trips are scattered throughout the metropolitan areas but many visitors' trips are concentrated in the central cities. Work trips follow an industrial pattern and social-recreation trips take place mainly in the evening. Airports are a typical due to differing functions and types of communities served, and ground transportation problems vary. The investigation of shopping centers revealed that the automobile was the only significant form of transport. Trip generation rates are not static, but trip production from households decreases regularly with increasing distance from the shopping center; 75% being shorter than 5 miles. With respect to industrial plant travel, the major manufacturing plant is a major trip generator, with about 95% of the daily tripmaking consisting of trips to work. Appraisal and application of findings, conclusions and suggested research are given. Appendices include an annotated bibliography, summaries of peak traffic data, transportation study travel survey characteristics, etc. Numerous tables, graphs, and statistical data.

K-003

Kent, Malcolm F.
INTERCITY FREIGHT HAULAGE, BY COMMODITY, SHIPPING DENSITY AND TYPE OF TRANSPORT, 1960. In: Freight Transportation. Highway Research Record, no. 82. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 1-31.

Data are presented on: tons and ton-miles of freight hauled in the United States

in 1960 by commodity groups (Bureau of the Budget classification); tons of freight hauled in the United States in 1960, by shipping density and by carrier (railway, inland waterway, highway, pipe line, or air). An appendix (pp. 10-31) lists commodity tonnages produced and transported in the United States by railways, domestic waterways, and highways in 1960. Pipe line and air line commodity statistics are given at the end. Highway ton-miles are not reported.

K-004

Kiley, Edward V.
LOOKING AHEAD. In: Trucking And The Economy. American Trucking Associations, Inc., Washington, D.C., 1965, pp. 21-30.

The trucking industry's importance to the economy is examined. Usefulness of a current index of intercity truck tonnage as an economic barometer is discussed and statistics are presented to support this premise. Statistics on trucking revenues are also presented. Future trends are explored. Projections for population, income, spending for 1980 are given as well as dollar predictions of increases in equipment and material that the growing trucking industry will require.

K-005

Kilpatrick, T.H.
METRO AIR SUPPORT 1966; A LESSON IN V/STOL POTENTIAL. Astronautic & Aeronautics, vol. 5, Jan. 1967, pp. 30-32.

In a mock crisis, the FAA's Metro Air Support used various V/STOL aircraft in New York City to demonstrate their potential. This two-day exercise, the first of its kind, was a success in demonstrating that prompt assistance can be provided by air to a stricken metropolitan area during an emergency. Industry representatives present showed interest in potential commercial operations, modifying existing sites to serve a full-time V/STOL landing sites. Mayor Lindsay plans to incorporate a permanent STOL terminal adjacent to the proposed Hudson-side World Trade Center.

K-006

Kloetzli, Jr., W. and L.A. McKee, Jr.
PIGGYBACK EXPRESS. Traffic Quarterly, vol. 20, no. 2, April 1966, pp. 288-97.

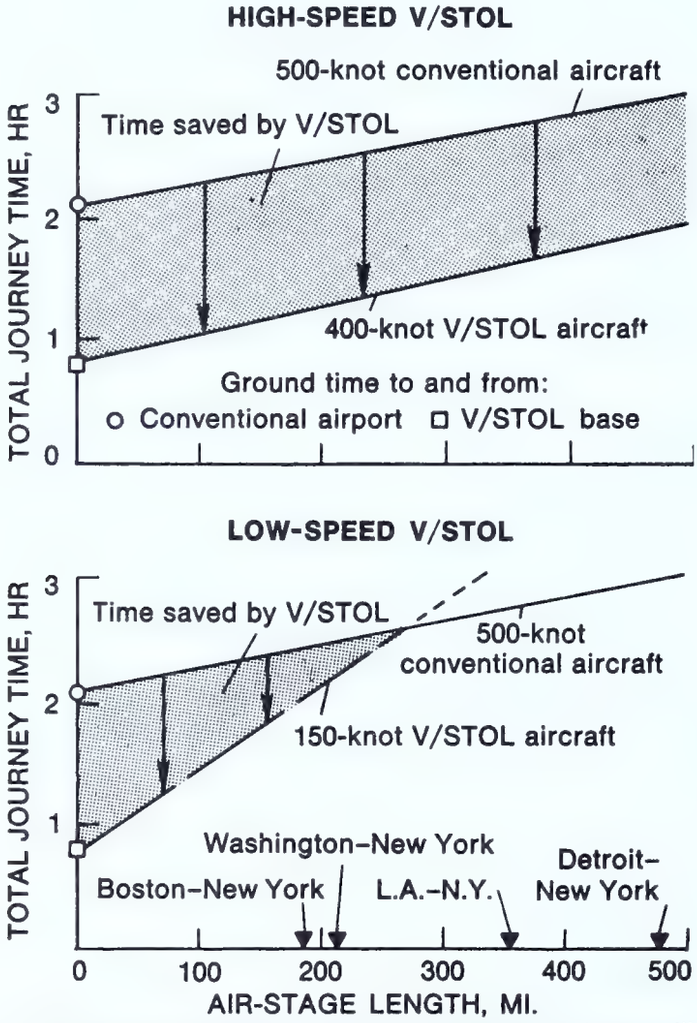
The authors propose a system of mass transit based on self-propelled, small, over-the-road vehicles which could be carried piggyback on a two- or three-deck self-propelled railway car, analogously to the delivery of new cars from the factory, except for the innovations of self-propulsion and rapid-loading ramps. By combining road and rail, the system would eliminate railroad stations thus uniting the best advantages of auto and rail travel.

K-007

Kuhn, R.E., M. W. Kelly and C.A. Holzhauser.
BRINGING V/STOLS DOWNTOWN. Astronautics & Aeronautics, vol. 3, no. 9, Sept. 1965, pp. 18-24.

The application of V/STOL aircraft to the area of short-haul intercity travel is

examined with respect to direct operating costs (DOC). Charts show the weights for V/STOL, STOL, and conventional aircraft and DOC in terms of field length and aircraft type. The factors which tend to reduce V/STOL operational cost are identified and the operational problems are outlined. It is shown that the success of V/STOL or STOL aircraft in commercial service depends on reducing operating costs and noise levels and on developing suitably located bases with special approach systems for IFR (Instrument Flight Rules) operations.



Both high cruising speed and conveniently located bases will be needed to reduce trip time in commercial VTOL or STOL service. Graphs compare high- and low-speed performance.

L-001

Lakshmanan, T.R. and W.G. Hansen.
MARKET POTENTIAL MODEL AND ITS APPLICATION TO A REGIONAL PLANNING MODEL. In: Urban Transportation Planning: Techniques and Concepts. Highway Research Record, no. 102. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 19-41.

A description of the formulation, testing, and application of a market potential model used to guide the scale, location, and scheduling of major retail concentrations in a growing metropolitan (Baltimore) area. Two tables, 14 figures, and a 17 item bibliography.

L-002

Lambden, W.
LETTING PASSENGERS CANCEL THEIR OWN TICKETS.
Bus & Coach, vol. 37, no. 6, June 1965, pp. 192-197.

Commuters who travel over fairly long distances make up a considerable proportion of peak hour traffic on Manchester Corporation's routes. Experiments were carried out employing one-man-operated 43-seaters for high speed service and the use of an Holstimatic ticket canceling machine was introduced by means of which passengers can cancel their own tickets which are bought in bulk at discount. Passengers who pay fare to the driver board on the left side of the entrance while people who carry tickets board on the right to use the machine. The layout of a Park Royalbodied Leyland Panther Cub is given and research which was carried out included a study of passenger journey patterns and times for boarding and alighting, etc.

L-003

Lang, A. Scheffer.
SHIFTING EMPHASIS IN TRANSPORTATION AND ITS IMPLICATIONS FOR RESEARCH. In: Shifting Emphasis in Transportation and its Implications for Research. Highway Research Record, no. 183. Highway Research, Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967, pp. 13-18.

The emerging view of transportation is that of a "system" phenomenon making research more important, more innovative and making it live within a complex and systematized institutional framework. Research is fundamental to a "system" concept of transportation because of the complex interactions, social, economic and physical which must be dealt with.

L-004

Lang, E.H.
REVIEW FUNCTION IN WATER RESOURCES DEVELOPMENT. ASCE Proceedings, vol. 92, (J. of the Power Division), no. PO1, Jan. 1966, paper 4622, pp. 39-54.

An historical survey of the review (as opposed to the policy-making, and/or administrative) functions of certain government agencies over the past 150 years; introduces a description of the present (1965) review procedures. Specific examples are given and the agencies listed. The Bureau of the Budget and the Corps of Engineers have the power of review over a number of activities relating to waterways.

L-005

Langley Research Center.
A PRELIMINARY STUDY OF V/STOL TRANSPORT AIRCRAFT AND BIBLIOGRAPHY OF NASA RESEARCH IN THE VTOL-STOL FIELD. Langley Research Center, Langley Field, Va. National Aeronautics and Space Administration, Washington, D.C., 1961.

L-006

Lansing, John B.
ISSUES OF ECONOMIC POLICY IN TRANSPORTATION. In: Transportation and Economic Policy. Free Press, New York, 1966, pp. 388-400.

One of the major policy issues in transportation is the extent to which the market mechanism may be relied upon to establish efficient pricing. In the author's view some governmental intervention, in the form of regulation or subsidies is justified, but there seems to be an urgent need to reduce regulation of competition by motor trucks, particularly with respect to establishment of minimum rates. While there is general agreement on the correctness of the user-charge principle, it must be qualified when substantial benefits also accrue to non-users from a given course of action. Investment policies should be subjected to economic analyses, efficient quantitative methods for this purpose being now available; however, the choice of investment alternatives in the public domain should properly come about through the political process. Continuation of government subsidies requires continued justification, and the least controversial areas for such subsidies are, at present, in urban mass transportation. Public intervention may also be justified in the field of development and testing of new technology and there seems to be general agreement that the fields of ocean transport and mass transportation are proper choices for such expenditures; but the potentialities of joint as distinguished from the currently fragmented study of the highway-vehicle combination also deserve investigation.

L-007

Lansing, John B.
TRANSPORTATION AND ECONOMIC POLICY. The Free Press, New York, 1966.

Contents include: Economic theory applied to transportation, including the economic functions of transportation, theory of investment and rate-making, and problems of organization; transportation in the economic development of the U.S. and other countries; modern transportation in the U.S., including statistical analyses and discussions of various modes of transportation.

L-008

Lansing, John B.
TRANSPORTATION BY WATERWAYS AND PIPELINES. In: Transportation and Economic Policy. Free Press, New York, 1966, pp. 356-373.

The total volume of freight moved along inland waterways is about equal to that moved by oil pipelines and together they account for about one-third of the total intercity freight traffic. When the deep sea domestic movements and shipments to the noncontiguous parts of the U.S. are taken into account, total movement by water becomes easily the larger. The total of 234 billion ton-miles of freight moved

along the inland waterways was distributed among the inland systems in 1963 as follows: Atlantic and Gulf coast waterways (21%), Mississippi River including the Ohio and tributaries (35%), Great Lakes system (41%), and Pacific coast waterways (3%). Important bulk commodities carried by water in domestic commerce were: petroleum and its products (42.6%), coal and coke (18.1%), iron ore, iron and steel (8.6%). The investment in waterways is described, as are the St. Lawrence Seaway, the government regulatory bodies, and the economic characteristics of inland water transportation.

L-009

Lathrop, George T., J.R. Hamburg and G.F. Young.
OPPORTUNITY-ACCESSIBILITY MODEL FOR ALLOCATING REGIONAL GROWTH.
In: Urban Transportation Planning: Techniques and Concepts. Highway Research Record, no. 102. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 54-66.

A model is described which attempts to bring into an objective framework methods and concepts which have been commonplace in planning for many years, such as holding capacity, access, and density, but whose application has previously often been subjective and defied replication. The allocation model is based for the most part on access to a regional center or set of regional subcenters. Variables other than access may be introduced by modifying the rank order of opportunities. Qualitative examination of the results of this study indicates that the settlement pattern has historically responded to access in much the way it has been measured by the model. Quantitative verification and calibration are difficult because historical data on the use of land and transportation networks are lacking. The authors are attempting to measure the extent to which population growth since 1940 can be explained by use of the model on the assumption that net activity densities have been fairly constant during this period. It is hoped that the model will lead to a better understanding of the urban growth process. It is intended that activity densities will ultimately be made endogenous to the model.

L-010

Lawler, C.A.
TRENDS IN AUTOMOBILE PARKING AT AIRPORTS. ASCE Proceedings, vol. 90 (J. Aero-Space Transport Division), no. AT2, Oct. 1964, paper 4076, pp. 69-83.

Facilities at several airports are reviewed and their programs for expansion are detailed. Parking programs are aimed at providing as much parking as possible as close as possible to terminal building.

L-011

Lee, G.H.
POSSIBILITIES OF COST REDUCTION WITH ALL-WING AIRCRAFT.
J. Royal Aeronautical Society, vol. 69, no. 659, November 1965, pp. 744-749.

A paper read at a symposium on Cheap Short-Range Air Transport. The author, of Handley Page, Limited, analyzes the whole design problem for the cheap short-range airplane and then gives a detailed description of two specific examples. Drawings show the seating layout, the basic design, and the evolution of the ogee. A table compares the features of the swept all-wing with the conventional aerobus.

L-012

Lee, Mary.
ELECTRIC VEHICLES. Science Journal, vol. 3, no. 3, March 1967, pp. 35-42.

The need to develop a small, fumeless car is stimulating research in the electric car. New battery developments, new possibilities of fuel cells or a combination of the two may make the electric car a reality in a very few years. This article discusses the research in progress in this field in England. To date, it is the small firms who have developed prototypes. One potential use of the car is self-service taxies which could be plugged into electric sources which would keep them charged. Drivers possessing special keys could unlock one, use it and return it to some convenient location. The technology to produce electric vehicles for many uses is available. One of the chief problems is to ensure public acceptance.

L-013

Leisch, J.E.
CAPACITY ANALYSIS TECHNIQUES FOR DESIGN OF SIGNALIZED INTERSECTIONS. Public Roads, vol. 34, no. 9, August 1967. Special Issue, "Design capacity charts for signalized intersections."

Installment 1 contains 18 nomographs, charts 1-15 covering general conditions found at 2-way and 1-way intersections under traffic signal control, with instructions for using charts covering various conditions and intersection designs; 16-18 covering the effect of bus stops at intersection and right and left turn lanes with and without signal indication. 34 sample problems are depicted and then solved using the nomographs. Two more nomographs with supplementary charts are to be published in Installment 2 in the October, 1967 issue of this journal. These are for preliminary and fast solutions in terms of over-all intersectional capacity.

L-014

Lessieu, Eugene J.
BUS TERMINAL PLANNING AND DESIGN. Proceedings of the 35th annual meeting of the Institute of Traffic Engineers (Suite 506, 1725 DeSales St. N.W., Washington, D.C. 20036) 1965, pp. 140-149.

Bus transportation, both local and inter-city, is the most widely used form of mass transit. Planning the facilities for bus operation, therefore, becomes of the greatest importance. Where the terminal is located, how it complements other forms of transportation, and its effect on the peripheral traffic all need consideration. Using the Port Authority Bus Terminal in New York as an example, the author discusses these problems in detail.

L-015

Levin, S.M.
AIRCRAFT NOISE, CAN IT BE CUT? Space/Aeronautics, vol. 46, no. 3, August 1966, pp. 65-75.

It can. Blade/vane ratios, the geometry of ducts, the aerodynamics of nacelle and wing, the mating of engine to airframe, all are designers' methods for doing so. But reductions in engine noise may also be accomplished by proper operation. As the noise profiles given in this article show, steeper takeoff and landing can re-

lieve noise significantly. Compression and exhaust, blades and vanes, noise and birds, the possibilities of absorbent lining, and other topics are discussed.

L-016

Levinson, Herbert S. and K.R. Roberts.
SYSTEM CONFIGURATIONS IN URBAN TRANSPORTATION PLANNING.
In: Top Issues in Urban Research 1963. Highway Research Record, no. 64. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963, pp. 71-83.

Urban transportation facilities should be planned, designed and operated as a unified system; hence system configuration aspects are analyzed with emphasis on highway networks. The approaches used are: empirical analyses of existing and proposed systems; and travel patterns simulated for a community of nearly 3 million people. One of the major conclusions is that route convergence to areas of high trip density should be avoided. Various principles emerging from this hypothetical study are considered as being relevant, regardless of the ability to quantify them in any given situation. These are: system permanence, system adaptability, continuity of capacity, equalization of lane densities, and provision of a clearly discernible and recognizable pattern.

L-017

Levy, S.L.
SIMULATION OF FREEWAY. U.S. Bureau of Public Roads - Conference on Traffic Surveillance, Simulation & Control, Proceedings, Sept. 14-15, 1964, pp. 166-74.

Experience with simulation of freeway traffic with respect to ramps has yielded information on needed precision of field traffic flow data, on reasonable results for traffic conditions simulated, and on anticipated ability to predict flow regimes for ramp configurations. 25 refs.

L-018

Lewis, R.M.
TUBE TRANSPORTATION: A FORWARD LOOK. SAE Journal, vol. 74, June 1966, pp. 36-9.

L-019

Lewis, R.W., E.F. Rosholdt, and W.L. Wilkinson.
A MULTI-MODE TRANSPORTATION NETWORK MODEL. Naval Research Logistics Quarterly, vol. 12, nos. 3 & 4, Sept.-Dec. 1965, pp. 261-274.

This paper describes a comprehensive transportation network model which exploits the special capabilities of large-scale, high-speed computing equipment in the evaluation of large complex transportation schemes. The model was developed to approach the fundamental requirement to compare quantitatively the performance of different transportation force levels against the cost of procuring, maintaining, and operating these force levels. A transportation network comprised of terminals (nodes) and connecting links provides a prototype model within which demands for intermodal transport and the capacity of these links to meet the demand can be compared with

each other with respect to performances and costs. The various types of input data (for this problem, which is one of naval logistics) are listed in sufficient detail to make the model usable for civilian purposes.

L-020

Litchford, G. and J.E. Gallagher.
SECONDARY SURVEILLANCE RADAR PROVES A BOON TO CONTROLLING HELICOPTER TRAFFIC NEAR AIRPORTS. SAE Journal, vol. 75, March 1967, pp. 92-5.

L-021

Longley, X. James W. and B.T. Goley.
A STATISTICAL EVALUATION OF THE INFLUENCE OF HIGHWAYS ON RURAL LAND VALUES IN THE UNITED STATES. In: Indirect Effects of Highway Improvement: 1962. Highway Research Board Bulletin 327. National Research Council. National Academy of Sciences, Washington, D.C., 1962, pp. 21-55.

Statistical techniques applied to previous attempts to evaluate the effect of highway improvement on land values are described. Basic to the analysis are the data collected by the Department of Agriculture for the Bureau of Public Roads on land values by type of road and farming area. Data from some 5,000 rural land sales were standardized and used to determine existing differentials between values of farm real estate, by type of road, as to price per acre, and as to price per farm and distance from nearest trading center. Other relationships of the influences of various types of rural highways on land values are explored. Certain general principles are formulated.

L-022

Los Angeles Chamber of Commerce.
NATIONAL CONFERENCE ON PLANNING AND DESIGNING OF URBAN HELICOPTER FACILITIES, 2ND, LOS ANGELES, CALIFORNIA, OCT. 18 - 19, 1962. (Papers) Developed and Sponsored by Los Angeles Chamber of Commerce, 1962.

Papers include: 10 year Outlook for Helicopters; How a Helicopter Flies; Application of the Helicopter; Planning for the Helicopter; Philadelphia's Approach to Municipal Responsibilities in Regard to Heliport Development and Related Helicopter Operations; Approach Taken by a Small City in Formulating Policy Governing Helicopter Landing Facilities; Effect of Real Estate Adjacent to Helicopter Landing Areas; Insurance Considerations - Helicopter Landing Facilities; Presentation on Safety Factors and Considerations in Urban Helicopter Operations; Local Safety Considerations; Helistop Sound Levels; Consideration of Helicopter Noise and Rotor Airflow in Heliport Planning; Planning, Designing and Operating Helicopter Facilities, from the Viewpoint of a Helicopter Air Taxi Operator; Financing and Managing Successful Helicopter Facilities; Community Heliport Planning for Scheduled Helicopter Feeder Service; FAA Criteria and Requirements for Helicopter Facilities in the National Airport Plan.

L-023

Lowry, I.S.
METROPOLITAN POPULATIONS TO 1985; TRIAL PROJECTIONS. September 1964. RM-4125-RC.

A summary of the results of two series of demographic trial projections covering

each of the 52 largest standard metropolitan statistical areas (SMSA's) in the United States. For each SMSA, the 1960 population is divided into 60 components (age, by sex and color). On the basis of explicit and detailed assumptions (outlined in appendixes) as to birth, death, and migration, the size of each component is estimated at five-year intervals, from 1960 to 1985. Results are compared to national projections prepared by the Bureau of the Census, and to SMSA projections prepared by various local agencies. 88 pp. Illus.

L-024

Lynch, J.T. et al.
PANEL DISCUSSION ON INTER-AREA TRAVEL FORMULAS. In: Traffic Origin-and-Destination Studies; Appraisal of Methods. Highway Research Board Bulletin 253. National Research Council. National Academy of Sciences, Washington, D.C. 1960, pp. 128-138.

The following methods have been suggested to predict the amount of travel: the growth factor method, which projects travel growth patterns on the basis of anticipated growth in different areas; the gravity model, which assumes that travel between two areas depends on their attractive power and the distance between them; Howe's electrostatic field theory of trip attraction; the model used in Chicago, which introduces the concept of intervening opportunities; a multiple regression method of forecasting travel volumes developed by the late Sam Osofsky; a model based primarily on the cost of travel.

M-001

MacAvoy, Paul W. and J. Sloss.
REGULATION OF TRANSPORT INNOVATION: THE ICC AND UNIT COAL TRAINS TO THE EAST COAST. Random House, New York, 1967.

M-002

Mackie, David I.
THE NECESSITY FOR A FEDERAL DEPARTMENT OF TRANSPORTATION. Journal of Public Law, vol. 8, no. 1. Emory University Law School, Atlanta, Georgia, 1959.

The Transportation Act of 1940 set the precedent for the Department of Transportation, although it had no single policy with respect to transportation as a whole. The legislative acts controlling the various modes of transportation at the date of this publication are presented. The author states the case for retaining existing agencies - notably the ICC, the CAB and the Maritime Commission. However, agencies which should be transferred to the proposed department are the Bureau of Public Roads, the Inland Waterways Corporation and assistive activities of such agencies as the Board of Engineers for Rivers and Harbors.

M-003

Maddox, C.F. and J.G. McQuaid.
INTERSTATE HIGHWAY SYSTEM SUPER TRANSPORT TRUCK. SAE-Paper 991A for meeting Jan. 11-15, 1965. 23 pp.

The concept and design of an experimental super transport truck for high-speed, long distance freight hauling on the interstate highway system of the 1970's by the Ford Motor Company, is described. The tractor, powered by a 600-hp gas turbine engine, pulls two 40-ft. tandem axle trailers at a gross combination weight of 170,000 lb. A special feature of the truck is the cab, designed for long-distance, non-stop, two-man operation, it is provided with sleeping accommodations, washroom conveniences, food facilities, and a complete heating and air-conditioning system. The 13-ft. high cab roof is flush with the top of the trailers, providing substantial aerodynamic advantage. Other features are mentioned.

M-004

Magruder, W.
OPERATION OF SUPERSONIC TRANSPORT AT AIRPORTS. ASCE Proceedings, vol. 90, (J. Aero-Space Transport Division), no. AT2, Oct. 1964, paper 4092, pp. 31-51.

It is shown that supersonic transport will be able to operate from existing airports with only minor modifications of terminal facilities; existing runway lengths and runway taxiway strengths are adequate; Lockheed variable angle nose configuration is shown to have distinct visibility benefits; takeoff and landing performances will be equal to those of subsonic jet transports.

M-005

Malcolm, D.G. and D.R. Earich.
DEVELOPMENT OF AN INTEGRATED HIGHWAY MANAGEMENT SYSTEM. In: Programing and Needs 1963 and 1964. Highway Research Record, no. 87. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 124-143.

A management system has been designed for a state highway department to improve the planning, scheduling, and control of operations in the fields of engineering, right-of-way acquisition, and construction. In the development of this system there have been three phases: highway program definition and management system feasibility, system design and initial operational capability, and full-scale implementation and training. The present paper deals mostly with the second phase, although the first phase is outlined. The critical path method (CPM or PERT) was used as the core for developing an integrated management system which would establish targets of performance for each organizational unit, define the manpower required and the money needed, and provide a means of monitoring accomplishements and pointing to potential problem areas before occurrence. The system design is given in some detail and figures supply additional information.

M-006

Maloney, William L.
SHIFTS IN PETROLEUM TRANSPORTATION. In: Freight Transportation. Highway Research Record, no. 82. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 94-99.

Although the oil industry uses all forms of transportation: pipelines, tankers, barges, tank cars, and tank trucks, pipelines are unique in that the material moves in one direction only and there is no return pay load. All the forms are indispensable to the industry and, in fact, they often complement each other. Tables show the growth of pipeline mileage and ton-miles from 1938 through 1963 (Table 1 below), different types of pipeline mileage in 1962, barrels of crude and oil products delivered per day in 1961-1964 (Table 4 on page 128), the volume of intercity ton-miles transported by different modes, shifts in the mode by year from 1938 through 1962 for crude and refined products. Data came from the ICC, the Department of the Interior and from industrial sources.

TABLE 1

GROWTH IN PIPELINE MILEAGE AND TON-MILES

Year	Miles[a]	Ton-Miles[b] (billions)
1938	119,050	64.4
1943	132,149	96.3
1948	151,626	119.6
1953	179,023	169.9
1958	189,932	211.3
1962	204,064	237.7

[a] Of crude, crude gathering and products lines (4).
[b] ICC annual reports.

TABLE 4

VOLUME OF INTERCITY TON-MILES TRANSPORTED

Mode	Ton-Miles (billions)		Percent of Annual Total	
	1952	1962	1952	1962
Railways, steam and electric including mail and express	623.373	599.977	54.98	43.04
Motor vehicles, for-hire and private use	184.106	331.900	16.24	23.81
Waterways, including Great Lakes	168.367	223.089	14.85	16.00
Pipeline (oil)[a]	157.502	237.723	13.89	17.06
Airways (domestic revenue service, including express mail)	0.415	1.182	0.04	0.09
Total	1,133.763	1,393.871	100.00	100.00

[a]Includes crude and product trunk lines and gathering lines.

M-007

Manheim, Marvin L.
PRINCIPLES OF TRANSPORT SYSTEMS ANALYSIS. In: Transportation System Analysis and Evaluation of Alternate Plans. Highway Research Record, no. 180. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967, pp. 11-20.

Nine principles for the analysis of transportation systems are presented and discussed. The principles are equally applicable to urban transportation, megalopolitan transportation, developing-country transportation, and strategic mobility. The first five principles pertain to the scope of the system; the components of a transportation system, the modes and movements in a system that require consideration, and the nature of a transportation system as a particular form of "market." The second group of four principles pertains to the problems of analysis: the spectrum of potentially available transportation and non-transportation options, the objectives of transportation, and the relevant impacts. A discussion of the application of these principles to the problems of urban transportation and strategic mobility is included.

M-008

Martin, Brian V., F.W. Memott, III and A.J. Bone.
PRINCIPLES AND TECHNIQUES OF PREDICTING FUTURE DEMAND FOR URBAN AREA TRANSPORTATION. M.I.T. Report no. 3. Massachusetts Institute of Technology Press, Cambridge, Mass., June 1961.

A compendium of methods published by others, this research report emphasizes the transportation planning process as a total process with three main phases, which are described in detail: inventories of existing conditions (land use, population, etc.); estimates of future urban area growth (population, economic activity, etc.); and determination of future travel demand (trip generation, modal split, etc.). Special emphsis has been given to those parts of the transportation planning process in which current methods are inadequate.

M-009

Masiello, R.J.
NEXT GENERATION OF SHORTHAUL AIRCRAFT. SAE-Paper 650223 for meeting Apr. 12-15, 1965. 10 pp.

The advent of supersonic transport makes imperative the cooperation of industry and government in developing a system of local service air transportation which will complement the speed and service of surface transportation and the long range aircraft currently under development for use in the 1970's. The requirements of the next generation of short haul aircraft are outlined relating to navigation and landing facilities requiring minimum investment, cabin/cargo configuration, and systems. The development of VTOL-STOL aircraft for local service airline applications is urged.

M-010

Massachusetts Institute of Technology.
THE GLIDEWAY SYSTEM: A HIGH-SPEED GROUND TRANSPORTATION SYSTEM IN THE NORTHEASTERN CORRIDOR OF THE UNITED STATES. M.I.T. Report no. 6. The M.I.T. Press. Massachusetts Institute of Technology, Cambridge, Mass., 1965.

Describes a systems approach to stimulate application of existing and future technology to a proposed design for a high speed Glideway system in the Northeast Corridor. It includes: system objectives; a network analysis with a model to predict future travel demand; proposed vehicle designs with power demands and vehicle dynamics; guideway design criteria, and surface, tunnel and foundation features; network location, problems, cost analysis, secondary network layout, and implications for growth and development; schedules, including mathematical programming model for optimum scheduling; propulsion and control, including fundamental design, communications, maintenance, and toll collecting; interchanges; economics of Glideway system, with comparative ticket prices, demand, fixes and long term costs, operating expenses, and secondary network; political implications with criteria for political support, impact on transportation interests, public financing, and administrative feasibility. With numerous tables, maps, and simulation models, and a 943 reference bibliography with index.

M-011

Massachusetts Institute of Technology.
PROJECT METRAN: AN INTEGRATED, EVOLUTIONARY TRANSPORTATION SYSTEM FOR URBAN AREAS. M.I.T. Report no. 8. The M.I.T. Press. Massachusetts Institute of Technology, Cambridge, Mass., 1966.

The formal report of a M.I.T. Systems Engineering course, in which the systems project consisted of the design of an evolutionary, integrated urban transportation system to meet the projected changes in metropolitan development. The proposed system is discussed, and criteria used in design explained. Automation systems for high and low density areas and the urban environment are presented.

M-012

May, Jr., A.D.
EXPERIMENTATION WITH MANUAL AND AUTOMATIC RAMP CONTROL. In: Freeway Operations. Highway Research Board, no. 59. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964, pp. 9-38.

The development of a control plan included the identification of critical section,

the determination of the period of time and the degree of control, the estimation of the redistribution of traffic, and the reevaluation of system operations. Ramp control consisted of partially closing one on-ramp, and metering traffic at the second on-ramp. The effect on the network of freeway ramp control was evaluated on the basis of vehicle-minutes and vehicle-miles of travel for each link, route, and for the total network.

M-013

McCafferty, J.J.
PIPELINES ARE MAKING BOLD BID FOR BIGGER ROLE IN TRANSPORT.
Iron Age, vol. 190, August 2, 1962, pp. 27-8.

A new pipeline will pump gasoline, kerosene, furnace oil and diesel fuel 1600 miles from Texas to New York. Sinclair is experimenting with piped heating oil in Poughkeepsie, N.Y., where 20 houses are being fed fuel by a pipeline from a central storage area where meters record individual amounts used. The coal industry is seeking Federal approval to build its own pipelines. There is a new high purity nitrogen pipeline. Liquefied wood pulp is moved by pipeline from a mill to a paper plant seven miles away. Solids may be transported now and freight may be moved in containers, passengers in capsules. New steels have made some of these things possible and automation has made them more profitable. These advances have caused other forms of transportation to experiment and provide new forms of service.

M-014

McDermott, J.M. and C.H. McLean.
IMPROVING TRAFFIC FLOW AT TRANSFER ROADWAYS ON COLLECTOR-DISTRIBUTOR TYPE EXPRESSWAYS. In: Freeway Operations. Highway Research Record, no. 59. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964, pp. 83-103.

This is an analysis of traffic operations on the Dan Ryan Expressway on Chicago's south side. The roadway features a five-mile section of four depressed traveled ways, two in each direction, with a total cross section of either 12 or 14 traffic lanes. The crossover connections from express lanes to local lanes or vice versa, are provided by two-lane transfer roadways at three locations for each direction of travel. The operational characteristics at the express-to-local transfer roadway were studied and "before" and "after" pavement markings compared.

M-015

McDonald, J.F.
AIRPORT COMPATIBILITY WITH SST - PROBLEMS OF GROUND SUPPORT EQUIPMENT. SAE-Paper 650208 for meeting Apr. 12-15, 1965. 20 pp.

The compatability of supersonic transport with 15 international United States civil airports is examined in principal areas including: terminals, passenger handling, ground support equipment, runway length and pavement strength, and airport and community noise. Some new support equipment and facilities will be required. Runways and pavement strengths are generally acceptable as they exist today. Noise, both in terminal areas and in the surrounding community, is expected to be equivalent to or less than that of contemporary subsonic jet transport aircraft.

M-016

McGrath, W.R.
URBAN THOROUGHFARE SYSTEM. Traffic Quarterly, vol. 20, October 1966, pp. 549-60.

The United States Conference of Mayors has formed an Urban Transportation Committee which in turn is served by a Technical Committee of outstanding traffic and transportation engineers. The author is chairman of this Technical Committee and presents some of its recommendations. There is need for a federally aided Urban Thoroughfare System and the arguments for this are presented with supporting statistical data. The proposal for the creation of this agency is accompanied by a description of the six characteristics of the program as well as a formulation of the seven functions of the municipal departments concerned.

M-017

McKain, Walter C.
COMMUNITY RESPONSE TO HIGHWAY IMPROVEMENT. In: Indirect Effects of Highway Location and Improvements. Highway Research Record, no. 96. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 19-23.

A case study portraying the socio-economic effect of the Connecticut Turnpike on eastern Connecticut. The Connecticut Turnpike has improved the economy of eastern Connecticut, increasing employment, wage rates, real estate values, retail sales, and tourist business, although the effect on individual communities was not uniform. The problems due to cultural and occupational background of the people are described.

M-018

McKenna, M.L.
AUTOMATED AIR CARGO TERMINAL, THEORY AND CONCEPT. SAE - 2nd International Forum for Air Cargo. Proceedings May 26-28, 1964, pp. G1-6.

The Atlantic Dividion of Aerojet General Corporation is engaged in the study, analysis and design of automatic freight and express sorting and handling systems for transportation terminals. Some sorting system designs for parcel post (railroad and post office) are described,procedures of which should be applied to development of automated air cargo terminals. The theoretical terminal concept and its principal elements are described. The data requirements, determining the optimum degree of automation, time sharing, terminal facility requirements and pay-back are covered.

M-019

McPike, A.L.
RECOMMENDED PRACTICES FOR USE IN MEASUREMENT AND EVALUATION OF AIRCRAFT NEIGHBORHOOD NOISE LEVELS. SAE-Paper 650216 for meeting Apr. 12-15, 1965. 9 pp.

SAE committee A-21, Aircraft Exterior Noise Measurements, was formed in 1961 to develop recommended practices for use in the evaluation of aircraft noise as it relates to airport neighborhood annoyance problems. The areas covered include: measurement, propagation, prediction and subjective rating of aircraft noise. The paper discusses evaluation of aircraft neighborhood noise levels and subjective measures by which comparisons can be made. Included in the discussion are the recommended practices adopted by SAE and those being studied by Committee A-21.

M-020

Memmott, Frederick W. III, B.V. Martin and A.J. Bone.
PREDICTING FUTURE DEMAND FOR URBAN AREA TRANSPORTATION. In: Urban Transportation; Demand and Coordination. Highway Research Board Bulletin 326. National Research Council. National Academy of Sciences, Washington, D.C., 1962, pp. 69-97.

A summary of a joint M.I.T. - Massachusetts Department of Public Works study. The conclusions emerging are: Transportation planning must be a total process, the principal aspects of which are: inventories of existing conditions, such as land use, population, vehicle ownership, vehicular travel, transportation facilities, and monetary resources; estimates of growth in terms of population, economic activity, vehicle ownership, land use, and the available transportation network; and determinations of future travel demand based on trip generation, modal split, interzonal transfers, and the assignment of traffic to transportation facilities. The feedback from level of service supplied by facilities to traffic demand is stressed. The Study methods are indicated and certain inadequacies of the current planning process are pointed out. An annotated bibliography of 177 items is presented in an appendix.

M-021

Metcalf, K.N.
TRANSPORTATION: INFORMATION SOURCES. Gale Research Co., Detroit, 1966.

This is an annotated guide to transportation information sources. It includes publications, agencies and other data sources concerning air, rail, water, road and pipeline transportation.

M-022

Meyer, J.R., J.F. Kain and M. Wohl.
RACE AND THE URBAN TRANSPORTATION PROBLEM. In: The Urban Transportation Problem. Harvard University Press, Cambridge, Mass., 1965, pp. 144-167.

The thesis of this chapter is that housing market segregation affects the nature of the urban transportation problem and the appropriateness of various public housing policies. If housing for nonwhite workers is centrally located, as it usually tends to be in U.S. cities, the nonwhite population with centrally located jobs will commute far less far (on the average) than if housing were not segregated. These centrally employed nonwhites thus incur somewhat higher housing costs and lower transportation costs than they would if housing were not segregated. On the other hand noncentrally employed nonwhites find that housing segregation causes them to commute farther and spend more on transport and possibly to pay more for housing. Since central employment is still much more common than noncentral employment among nonwhites, the net transport effect is probably to reduce over-all urban transport requirements of nonwhites. For whites employed at central locations, the hypothesis is reversed: housing segregation increases transportation costs and the centrally employed white thus spends more on transport and less on housing than he would if the housing market were racially unconstrained. These hypotheses imply that whites pay a price for housing segregation in higher transport costs, but only if they are centrally employed. Nonwhites probably spend less on urban transport than they would freely choose to if their housing choices were not constrained. The costs of serving the urban transport needs of nonwhites are probably further reduced by housing segregation causing considerable reverse commuting (out in the morning, in in the

afternoon) that uses capacity that would otherwise be unused. This chapter is a testing, using Detroit and Chicago data from origin and destination studies, of these hypothese. In general, they were supported by the empirical evidence. Noncentrally employed nonwhites seem to travel relatively long distances to work while noncentrally employed whites usually manage to live reasonably close to their work. Discrimination forces minority groups into a disproportionate amount of cross-hauling and reverse commuting. Ghettos are usually near central business districts and, since more and more workplaces are located at the fringes, more and more Negroes will be travelling in directions opposite the main streams of commuters unless housing discrimination is lessened. Income differences partially explain differences in housing patterns, but housing segregation is the main determinant. The obvious and the less probably costs of racial segregation are also evaluated in this chapter.

M-023

Meyer, John R. et al.
THE ECONOMICS OF COMPETITION IN THE TRANSPORTATION INDUSTRIES. Harvard Economic Studies, vol. 107. Harvard University Press, Cambridge, Mass., 1959.

The authors first describe the technical procedures and statistical techniques to be used in their study of the costs involved in railroad, highway, and other modes of transportation. After presenting their findings in those areas, they discuss rational allocation of transportation resources. The relative costs of known close competitors for the movement of bulk, high-value, and passenger traffic have been considered and, as a first approximation, traffic has been allocated to any form of transport whose full costs are less than the nearest competitor's marginal or average variable costs. Based on these criteria bulk commodities should move by pipe line or water. High-value commodities should move by rail carload or rail piggyback, both of which have substantial advantages over package freighters and truck. Piggyback operations should probably be used for straight-rail carload movements. Rail passenger transportation is not economical although short-haul, high-density traffic may be an exception. Application of marginal or average cost principles to the various modes indicated that the economic justification of rail and intercity truck transport was doubtful, but that rationalization of railway operations and elimination of uneconomic overhead costs, together with ability to use a pricing policy more closely reflecting marginal costs, would result in improvements in the position of the railroads and probably diversion of substantial intercity freight from trucks to railroads. There are other instances where truck costs could be substantially less than rail. Finally, suggestions are made for improving both public and private policies: substantial reduction in regulation and reliance on competition to ensure rates and services in the public interest.

M-024

Michigan, Department of Commerce.
TRANSPORTATION-PREDICATIVE PROCEDURES. Technical Report No. 9. State Resource Planning Program, Michigan Department of Commerce (208 E. Michigan Ave., Lansing, Mich. 48913), Dec. 1966. 4 vols.

In connection with the objectives of the State Resource Planning Program, an extensive study of transportation, both public and private, was undertaken by Michigan. To try to reduce the duplication of planning efforts of different departments, representatives of Administration, Conservation, Highway, and Economic Expansion Departments were asked to take part. The report covers travel by air, water and highways. Pipelines and rail transportation were not treated in great depth through lack of personnel to cover these fields adequately. A summary presents the findings.

The other three volumes contain reports of the Aeronautics Commission, the Department of State Highways and the Waterways Division of the Department of Commerce.

M-025

Miller, A.J.
ANALYSIS OF BUNCHING IN RURAL TWO-LANE TRAFFIC.
Operations Research, vol. 11, March 1963, pp. 236-47.

A model is proposed for the formation of bunches in rural two-lane traffic. An overtaking rate is defined and estimated from data. The relation between these overtaking rates and various other factors is investigated. It is shown that with the data available, the model provides an exceptionally good fit. Formulas are then derived for the rate of delay to vehicles on rural roads caused by restricted overtaking. The model is not recommended for the analysis of urban traffic. For urban traffic, it is suggested that variance/mean ratios provide a useful measure of bunching.

M-026

Miller, R.H.
LONG RANGE POTENTIAL OF VTOL AIRCRAFT. ASCE Proceedings, vol. 91, (J. Aero-Space Transport Division), no. AT2, Oct. 1965, paper 4487, pp. 13-28.

One factor limiting VTOL aircraft has been the very large increases in thrust required for vertical as opposed to horizontal takeoff; hence the need for additional power which increases weight, reducing the payload to economically impractical values. The other factor has been the difficulty in handling aircraft at close to zero airspeed, although VTOL's independently controlled horizontal and vertical velocities have a potential for improving safety of flight and permitting an all-weather capability. Although attractive for short haul air transportation, the operating costs for VTOL make it impractical, though long haul transportation can be provided at costs competitive with ground transportation. The possibilities of VTOL supersonic transport and VTOL launchers for space flight are discussed.

M-027

Miller, R.H.
V/STOL TECHNOLOGY-PROBLEMS AND PERSPECTIVES.
Astronautics & Aeronautics, vol. 3, no. 9, Sept. 1965, pp. 32-35.

This is a critical analysis of problems of VTOL aircraft and its potential for full commercial or military use. Factors considered are: payload penalty, handling problems and required over times, direct operating cost, and problems of maintenance. Developments needed in these areas are indicated.

M-028

Miller, Ronald E.
DOMESTIC AIRLINE EFFICIENCY: AN APPLICATION OF LINEAR PROGRAMMING.
The M.I.T. Press, Cambridge, Mass., 1963.

Contents include the economics of air transportation, including the nature of airline costs, revenues, market structure and performance; the regulation of air

transportation, citing the operation of the Civil Aeronautics Board; the basic formulation of a model, of allocation of planes to routes, solved by means of linear programming; and specific interpretation of the model, together with data sources.

M-029

Mitchell, C.S.
BIG FUTURE SEEN FOR PIPELINES. Chemical & Engineering News, vol. 44, April 25, 1966, p. 23.

Construction of present and future petroleum pipelines is outlined. A large-diameter crude-oil line from the Texas-Louisana Gulf Coast to the Philadelphia refining area is under construction. Future use of slurry pipelines is predicted. Possibilities for such lines are fertilizers, (e.g. beneficiated phosphate rock could be ground at the mining site and pumped to the plant for making superphosphate and phosphoric acid), and iron ore, which could be transported to pelletizing plants at steel mills.

M-030

Moldoff, S.
DEVELOPING A TRANSPORTATION SYSTEM. Technical Information series no. 66SD299. General Electric, Missile and Space Division, King of Prussia, Pa., December, 1966.

A program for the development of an integrated, balanced transportation system is provided, with the Northeast Corridor as an example. As traffic becomes denser and trips longer, efficiency dictates the need for a management sciences approach to transportation in which both the system engineer and operations analyst are used in decision-making. The various interest groups (travelers, property owners, etc., etc.) in transit planning are listed in detail for evaluation and incorporation in system calculations. The use of models for these purposes is discussed. A conceptual system of transit and a plan for developing it are discussed in the light of political, economic and social facets of the problem. A bibliography and an appendix on Transportation as a Field for Systems Engineering are provided.

M-031

Moldoff, S.
THE PHILADELHPHIA TRANSPORTATION SYSTEM, A MODEL FOR 1985. Technical Information series no. 66SD230. General Electric, Missile and Space Division, King of Prussia, Pa. December 1966.

This report is introduced with a discussion of the fundamental problems of urban transportation: the lack of "system," the need for good design, and the implications of access to travel facilities. The second section projects traffic loads to 1985 -- far enough into the future to permit rational evolution of a system. The model of the system needed to carry that load is then presented in broad brush, with subsystems and interfaces categorized. In Sections 4, 5, and 6 a first cut is made at quantifying some of the most important elements of the system, and in Section 7 the access and transfer problems are examined. Finally, a plan for implementation is outlined. Includes two Appendixes. Appendix A is on the Philadelphia area with 2 charts: "Population Trends" and "Income Distribution by Counties." Appendix B contains 8 tables and 15 charts of selected data from the Penn Jersey Transportation Study.

M-032

Moldoff, S.
THE PROBLEM OF ACCESS TO THE PROPOSED NORTHEAST CORRIDOR HIGH SPEED TRANSPORTATION SYSTEM. Technical Information series no. 66SD340. General Electric, Missile and Space Division, King of Prussia, Pa., Dec. 1966.

The design of access facilities to the Northeast Corridor system will be affected by such attractiveness variables as: cost, speed, safety, convenience, comfort, and dependability; attractiveness being defined as a function of the above independent variables. Controllable variables are defined as line length, station spacings and locations, vehicle speeds, capacities, and headways. Optimum values are calculated for the above. Trip parameters are defined, in relation to feeder systems, as: portal to portal travel time, direct cost, dependability, comfort, convenience and safety. Various access possibilities (e.g. walking, private vehicles, public transportation) are examined in the light of the above variables. The following conclusions are reached (with particular reference to Philadelphia): the high speed line must provide access by providing a sufficient number of suitably placed stations together with efficient interchange with feeder modes. Average station spacings should be in the vicinity of 25 to 32 miles.

M-033

Morin, D.A.
APPLICATION OF STATISTICAL CONCEPTS TO ACCIDENT DATA. Pub. Roads, vol. 34, April 1967, pp. 135-7; 150.

The author points out the necessity for applying statistical concepts to traffic accident data. Although procedures for determining the significance of accident data have already been developed, little has been accomplished toward their application. Procedures are suggested by which the limited available accident data can be analyzed and erroneous conclusions avoided. The importance of statistical analysis of data is illustrated by one State's failure to identify unstable accident rates; high priorities were assigned to some highway sections that had few accidents and low priorities were assigned to other sections that had numerous accidents. Also discussed were the normal chance variation in accident rates, the minimum accident rates that definitely exceed an established tolerable rate, and the percentage of accident reduction needed to establish the reliability of a road section improvement.

M-034

Morris, Ronald E. et al.
ECONOMIC IMPLICATIONS OF A UNITED STATES SUPERSONIC TRANSPORT AIRCRAFT UPON AIRPORTS AND ENROUTE SUPPORT SERVICES. VOLUME I, EXECUTIVE SUMMARY. Planning Research Corporation, Los Angeles, California, Dec. 1966. AD 651 657.

This report defines the economic implications to government and local agencies of modifications to airports, terminals, and enroute support facilities as a result of the introduction of a United State supersonic transport aircraft (SST) into scheduled commercial service by U.S. and foreign carriers. Costs associated with modifications to the ground environment and enroute support services which advanced high-capacity commercial transport aircraft may require, are identified. Only those improvement programs beyond the normal planning responses to increased traffic and technologic advances are attributed to the larger, faster airliners which will fly within the next 9 years. The costs of these aircraft-sponsored modification programs are allocated among the four competing aircraft: stretched subsonic (DC-8-63); high-capacity subsonics (B-747 and L-500); Concorde; United States SST. This report is divided

into four parts. Volume I presents the summary and conclusions of the study of the economic impact of a United States supersonic transport aircraft upon airports and enroute support services; Volume II describes the economic implications of the SST upon airports; Volume III relates the economic implications of the SST upon enroute support services, and Volume IV provides a discussion of the adequacy of airport pavements for the next generation of commercial aircraft. Contains numerous charts and tables, one of which is reproduced below.

EXHIBIT 1 - SUMMARY OF COSTS OF SST REQUIREMENTS THROUGH 1975

Category	Costs Through 1975 (Millions of Dollars)	Costs Sponsor	SST Unique
Airports and Terminals attributable to Boeing design[1/]	$ 14	$7 FAA (1/2)[2/] $7 Local and state Gov'ts. (1/2)	minimal
Enroute Support Services	$650[3/]		zero
Airways	-		
Navigation	-		
Communications	-		
Meteorology (Operational 1970)	$ 88 invest. $555 O&M (111/yr.)[4/]	U.S. (through Department of Commerce) and participating foreign nations for World Weather Watch system	
Radiation (Operational 1967)	$ 2 invest. $ 4.8 O&M (0.6/yr.)[4/]	NASA - for Apollo Space Radiation Warning Network	

Notes: 1/ Attributable to Lockheed design - $19 million costs thru 1975, $19 million SST unique.

2/ FAAP provides for up to 50 percent federal participation for pavement improvements.

3/ $650 M represents total Enroute Support Services Costs from respective estimated systems operational dates through 1975

4/ A rule-of-thumb has been applied stating that the first two years' O&M costs are approximately equivalent to one year's normal O&M costs.

M-035

Morrow, C.
PLANNING NATIONAL AIRPORT SYSTEM TO SERVE 70'S.
Civil Engineering (NY), vol. 35, no. 8, Aug. 1965, pp. 62-64.

A new concept in providing an airport system to meet the needs of the interurban traveler is presented. It is estimated that air traffic will double in 10 yr and triple in 15 yr. Future use of air transportation for long-haul passenger traffic will be accelerated by rapid growth in large urban regions. The year 1970 will see much more use of helicopters and other V/STOL aircraft.

M-036

Mosher, F.F.
A CAPACITY RESTRAINT ALGORITHM FOR ASSIGNING FLOW TO A TRANSPORT NETWORK. Special Report. ITTE. University of California, Los Angeles, Calif., Jan. 1963.

M-037

Moulton, R.J.
EFFORTS OF INTERGOVERNMENTAL ORGANIZATIONS TO SPEED HANDLING OF AIR CARGO, PARTICULARLY THROUGH CUSTOMS. SAE - 2nd International Forum for Air Cargo. Proceedings May 26-28, 1964, pp. P1-8.

The measures proposed by the International Civil Aviation Organization which have to be taken by various governments, airport administrations, and carriers, include: reduction and simplification of clearance documents, liberal application of sample or selective techniques in clearance examination, provision of adequate handling, clearance and warehousing facilities at international airports, and simplified trans-shipment procedures.

M-038

Moyer, R.A. and J.E. Lampe
STUDY OF ANNUAL COSTS OF FLEXIBLE AND RIGID PAVEMENTS FOR STATE HIGHWAYS IN CALIFORNIA. In: Engineering Economy 1963. Highway Research Record, no. 77. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 133-172.

This study provides results for more than 600 solutions of annual costs of pavements in which the effect on annual cost of eight major variables is set forth. The variables included in the study consisted of subgrade quality, traffic indexes for light, medium and heavy traffic, contract bid prices, interest rates of 3 and 6%, service life of initial pavement, annual costs computed for analysis periods of 26 and 35 years, average maintenance costs, and total shoulder width of 22 ft and two-lane pavement width of 24 ft.

M-039

Moyer, Ralph A.
COMPREHENSIVE URBAN TRANSPORTATION STUDY METHODS. ASCE Proceedings, vol. 91, (J. of the Highway Division), no. HW2, Dec. 1965, paper 4575, pp. 57-87.

The Federal government plays an important role in urban transportation through two agencies, the Bureau of Public Roads, U.S. Dept. of Commerce, and the Urban Renewal Administration of the Housing and Home Financing Agency by the terms of the Federal-Aid Highway Act of 1962 which also officially recognized the importance of conducting urban transportation studies. The basic steps for conducting urban transportation studies, organization design, geographic design, data collection, data processing, design of transportation systems, public discussion of alternative transportation plans, analysis of methods of financing and implementation of alternative plans, adoption of a master transportation plan, and recommendations for a continuing comprehensive transportation planning process, are each discussed in depth.

M-040

MPC Corporation.
TESTING AND EVALUATION OF THE TRANSIT EXPRESSWAY.
MPC Corporation, Pittsburgh, Pa., Feb. 1967.

A testing and evaluation of the mass transportation demonstration project in South Park, Allegheny County. The report covers a description of the project as installed at South Park; a description of the test and evaluation program designed to determine the engineering, operating, and economic feasibility, and public acceptance of the Transit Expressway; the observations and results of the test program; and their evaluation. It concludes that this pilot project is a successful demonstration of feasibility of this type of system for metropolitan areas of medium population densities. Further studies, to refine the technology to the point of making preparation of manufacturing specifications for a possible commercial system feasible, are recommended.

M-041

Mueller, E.A.
NEW LOOK AT HIGHWAY CAPACITY. Traffic Quarterly, vol. 20, July 1966, pp. 322-46.

A review of the 1965 publication, Highway Capacity Manual, (Highway Research Board Special Report 87). The original Highway Capacity Manual, long out of print, was published in 1950, sold more than 26,000 copies and was translated into nine languages. The fundamental changes and similarities between it and the new one are summarized. The titles of the chapters in the two are listed in a table both for comparative purposes and to help orient the user of the new manual. Each chapter is then discussed.

M-042

Muir, Allan T.
CANADIAN PORTS AND SEAWAY DIRECTORY: INCLUDING UNITED STATES PORTS ON THE GREAT LAKES. 22nd edition. National Business Publications, Ltd., Gardenvale, Quebec, Canada, 1966.

An alphabetical listing of places, with their latitudes and longitudes, products and industries, the port authority (including fees), approaches, formalities, accommodations, and services. Erie, Pennsylvania, is included.

M-043

Mullen, Russell H.
LAND ACQUISITION AND HIGHWAYS: PRESENT IMPACT AND FUTURE PROSPECTS.
Right-of-Way, vol. 14, no. 1, Feb. 1967, pp. 54-56.

Acquiring land for urban highways becomes increasingly expensive. It also becomes increasingly rare and the public outcry over the demolition of neighborhoods becomes louder. Present laws demand that the displaced persons be helped with their moving expenses, that a fair market value be paid for their holdings, and that, when necessary, government help should be provided in rehousing them. In spite of this, it is frequently impossible for a householder to buy another house for the money he is given or in the area from which he is moved. It is imperative, therefore, that the highways be planned and built in the underdeveloped areas before they become urbanized and that it be recognized that there is a saturation point in the cities, beyond which highways contribute chaos instead of order.

N-001

National Academy of Sciences.
NEEDED TRANSPORTATION FACTS. In: Conference on Transportation Research; report of a study group convened by the National Academy of Sciences at Woods Hole, Mass., August 1960. National Research Council. National Academy of Sciences, Washington, D.C., 1960, Publication 840, pp. 51-60.

Effective study of transportation, which calls for many types of basic data and statistical information, has uncovered new needs for data and gaps in existing information. The Conference concluded that current information was not adequate for scientific examination of the transportation system as a whole, nor its relationships to vital economic, social, political, and defense questions. There will be unforeseen needs for data which will be outside the scope of interest and authority of present data-collection bodies, which are inadequate. It was recommended that information functions be assigned to a diversified group whose basic purpose would be to understand transport as a whole and to develop suitable information sources.

N-002

National Academy of Sciences.
POTENTIALS FOR TRANSPORT ANALYSIS. In: Conference on Transportation Research; report of a study group convened by the National Academy of Sciences at Woods Hole, Mass., August 1960. National Research Council. National Academy of Sciences, Washington, D.C., 1960, Publication 840, pp. 61-74.

Systems analysis can be used to dovetail transportation into the larger framework of the national society. This new type of analysis which can be applied to systems of varying size, may be applied to something as complex as the nation's over-all transport system. Systems analysis for transportation characteristically provides perspective with respect to geography and function and time, with cumulative benefits. Examples of systems analysis where several modes have been considered simultaneously are given. Types of models are categorized into four major groups: insight, resource allocation, design, and operations. Trends and applications of systems analysis are discussed.

N-003

National Academy of Sciences.
TRANSPORTATION DESIGN CONSIDERATIONS. Selections from the Proceedings of the Transportation Research Conference of the National Academy of Sciences at Woods Hole, Mass., August, 1960. National Research Council. National Academy of Science, Washington, D.C., 1961, Publication 841.

The environmental and institutional framework of transportation is discussed in relation to the federal government and national transportation. Systems engineering and coordination of transportation systems, urban planning, and specific modes of transportation are covered in 31 papers.

N-004

National Association of Motor Bus Owners.
BUS FACTS - 34th EDITION - 1966. National Association of Motor Bus Owners, Washington, D.C., 1966.

N-005

National Highway Users Conference.
HIGHWAY TRANSPORTATION LEGISLATION IN 1965. National Highway Users Conference, Washington, D.C., 1966.

A summary of federal and state activity.

N-006

National Highway Users Conference.
SALES AND USE TAXES AND SIMILAR TAXES AFFECTING MOTOR VEHICLES: A STATE-BY-STATE STUDY. Legislative Reporting Dept. National Highway Users Conference, Washington, E.D., 1964 (rev.)

N-007

National Highway Users Conference.
SIZE AND WEIGHT RESTRICTIONS ON TOLL ROADS AND TURNPIKES. National Highway Users Conference, Washington, D.C., 1962.

N-008

National Transportation Action Program Forum.
IMPACT OF THE NEW DEPARTMENT OF TRANSPORTATION: AN IN DEPTH REPORT OF THE NATIONAL TRANSPORTATION ACTION PROGRAM FORUM, NOV. 10, 1966, IN WASHINGTON, D.C. U.S. Chamber of Commerce, Washington, D.C., 1966.

N-009

The National Waterways Conference, Inc.
WATERWAY TOLLS AND THE STEEL INDUSTRY. In: Issues in Transportation Economics. Karl M. Ruppenthal, ed. Charles E. Merrill Books, Inc., Columbus, Ohio, 1965, pp. 236-244.

Tolls or user charges would place economic burdens on the steel industry. For example, 18 million tons of coal are received by barge. If rail transport were used the cost would be increased by $18.5 million. Parallel figures are given for oil, ore, scrap, stone, and finished products. The total increase for finished products would amount to $96 million annually.

N-010

Nelson, James R.
THE DYNAMIC INTERDEPENDENCE OF TRANSPORTATION COSTS, AND THE RATES OF GROWTH OR DECLINE OF THE VARIOUS MODES OF TRANSPORTATION. In: Transportation Economics. National Bureau of Economic Research, Special Conference 17. National Bureau of Economic Research, New York, 1965, pp. 43-60.

The interactions of prices, costs, rates of growth and their cumulative effects are considered, with special emphasis on the railroads. Historically, the technical origin of interdependence was the existence of a permanent right-of-way under the control of the firm operating the facilities and offering final transportation services to the public. The outstanding single source of decreasing costs was the permanent way. Vertical integration was the source of the price differentiation carried through to the final consumer. No other major form of transportation had these technical resources. Oligopolistic warfare would have been possible between turnpike authorities but the institutional development of the highway industry probably has closed this possibility. Modern methods of freight transport must work within time limits or adhere to schedules, something not true of 19th century railroads. The possibility of decreasing costs with additional capital investment is considered. The future of railroads may be foreshadowed by the history of coastal shipping. High terminal costs and slow and unattractive service contribute to the decline in both instances. Public policy should be influenced by the continuous exploration of future solutions with the aid of models which incorporate the interrelationships of cost, demand, price and service. Regulation might be de-emphasized under just those conditions of industrial age and converging industrial problems which seem to make regulation most secure and necessary. Age tends towards inflexibility even without regulation. New competition may require greater flexibility just when regulation induces inflexibility.

N-011

Nelson, W.L.
RECENT PIPELINE-CONSTRUCTION COSTS. Oil and Gas Journal, vol. 64, no. 19, May 9, 1966, p. 127.

A supplement to data given in a previous issue of this Journal. Recent per-mile costs of constructing pipelines are given by inches of diameter, from 6 inches through 36. Pipeline-construction cost indexes are given by year for 1934, 1940, and 1945 through 1965 in terms of ICC-system averages and as a function of line size (6, 12, 24, and 30 in.). The indexes average out differences in pipe thicknesses, extreme variations in labor costs, amount of rock encountered, number of river or highway crossings, and the depth of cover or trench. One of a continuing series of cost studies.

N-012

Newell, Gordon F.
STOCHASTIC PROPERTIES OF PEAK SHORT-TIME TRAFFIC COUNTS. Research Report 49. Institute of Transportation and Traffic Engineering, University of California (Berkeley, Calif.), Nov. 1966. 23 pp.

Traffic flow past a point varies with time owing partly to statistical fluctuations and partly to a variation in the mean. Highway traffic surveys frequently include, as a measure of this variation, peak short-time flows (1, 5, or 15-min. flows) during a longer time (15, 30, or 60 minutes). Near the peak of the rush hour, the expected flow should be nearly stationary and variation in short-time flows should be due

mostly to statistical fluctuations. This paper describes methods for estimation of these peak flows under the assumption that the short-time flows are approximately a stationary Gaussian process with a variance-to-mean ratio of about 1. The theory suggests that one can predict the distribution of peak short-time flows (5-min. flows, for example) from the peak long-time flows (15 or 30-min. flows). Experimental data seem to confirm this. The implication is that these short-time peaks have no obvious relation to highway capacity beyond that already inferred from the longer-time flows.

N-013

Niedercorn, J.H.
AN ECONOMETRIC MODEL OF METROPOLITAN EMPLOYMENT AND POPULATION GROWTH. October 1963. RM-3758-RC.

A description of an econometric model designed to explain the growth of employment and population in 36 of the nation's largest metropolitan areas. The mode is formulated, estimated, and tested. Forecasts made with it indicate that population and employment growth will be rapid in most of these areas. Central cities will become increasingly specialized in white-collar employment, while blue-collar employment will tend to move to the suburbs. Increased commuter traffic between the central city and its suburbs is likely in a majority of the 36 metropolitan areas. 47 pp. Illus.

N-014

Niedercorn, J.H. and J.F. Kain.
SUBURBANIZATION OF EMPLOYMENT AND POPULATION 1948-1975. January 1963. P-2641.

An analysis of the postwar redistribution of employment and population within 39 of the largest U.S. metropolitan areas. Rapid growth has occurred in the metropolitan ring and only slow growth in the central city. An econometric model indicates that these trends are likely to continue in the future. The significance of these findings for urban development and transportation planning is discussed. 39 pp. Illus.

N-015

Noakes, E.H.
TRANSIT FOR THE HANDICAPPED. Nation's Cities, vol. 5, no. 3, March 1967, pp. 32-33.

Design requirements to allow use of mass transit facilities by handicapped people are outlined. Requirements for stations, rail rapid transit cars, and rapid transit buses are presented. The author states that by including chronic diseases, broken bones, and pregnancies as handicaps, up to 44% of the population can be considered handicapped.

N-016

Nolen, John Jr.
DEFINING "INTERCITY" FOR TRANSPORTATION PURPOSES. In: Freight Transportation. Highway Research Record, no. 82. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 109-113.

The concept of the "city" as a well-defined geographic or physical entity contained within its political boundaries and of the suburbs as distinct communities is no longer tenable. Today there are compact metropolitan complexes, with the daily ac-

tivities of the area dominated by interlocking streams of all forms of transportation. The Bureau of the Budget has established the concept of the Standard Metropolitan Statistical Area (SMSA) and, in 1960, the SMSA's contained 63% of the population. Various economic and legal and sometimes contradictory views on the definition of "intercity" are discussed and it is suggested that the term "intercity" is outmoded and "extra-urban" is more applicable, with the SMSA being the most practical geographical unit for statistical study of movement between urban centers.

N-017

Nordlie, P.G.
TO AND FROM AIRPORT. ASME Meeting, June 26-28, 1962. Paper 62-AV-8.

Fundamental problems of airport transportation and major factors are studied; a relationship between popularity of air travel and characteristics of airport transportation is suggested, and short haul range of air travel identified as sector of market most vulnerable to influence of unsatisfactory airport transportation; new concepts of airport transportation are needed.

N-018

Northwestern University. Transportation Center
THE COST OF TRUCKING: ECONOMETRIC ANALYSIS, by M.L. Burnstein, A. Victor Cabot, John W. Egan, Arthur P. Hurter, Jr., and Stanley L. Warner. William C. Brown Co., Dubuque, Iowa, 1965.

N-019

Northwestern University. Transportation Center.
CURRENT LITERATURE IN TRAFFIC AND TRANSPORTATION, vol. 8, no. 7. The Transportation Center Library. Northwestern University, Evanston, Illinois. July, 1967.

A monthly guide to materials from current periodicals, books, research reports, etc., acquired by the Transportation Center Library.

N-020

Northwestern University. Transportation Center.
TRANSPORTATION GEORGRAPHY RESEARCH. U.S. Army Transportation Research Command, Fort Eustis, Va., 1960.

A preliminary report of fundamental research relating to areal distributional aspects of transportation resources, orientated toward the development of transportation forecast methodology.

O-001

Oberman, Leonard S.
FUNCTIONAL PLANNING OF BULK MATERIAL PORTS. ASCE Proceedings, vol. 91, (J. Waterways & Harbors Division), no. WW2, May 1965, pt. 1, paper 4310, pp. 17-25.

A summary of important new factors to be considered in planning and design of high-capacity dry bulk terminals serving ocean-going vessels. New concepts in material handling methods and equipment make it essential for terminal planners to consider operational procedures, departing from the conventional methods, in order to avoid premature obsolescence of port facilities. These may be best described as the application of mass production techniques to mass transportation of bulk materials. An unconventional terminal design based on a functional approach is shown below; the unit train concept in cargo handling is considered with no classification yards, switching, or delays.

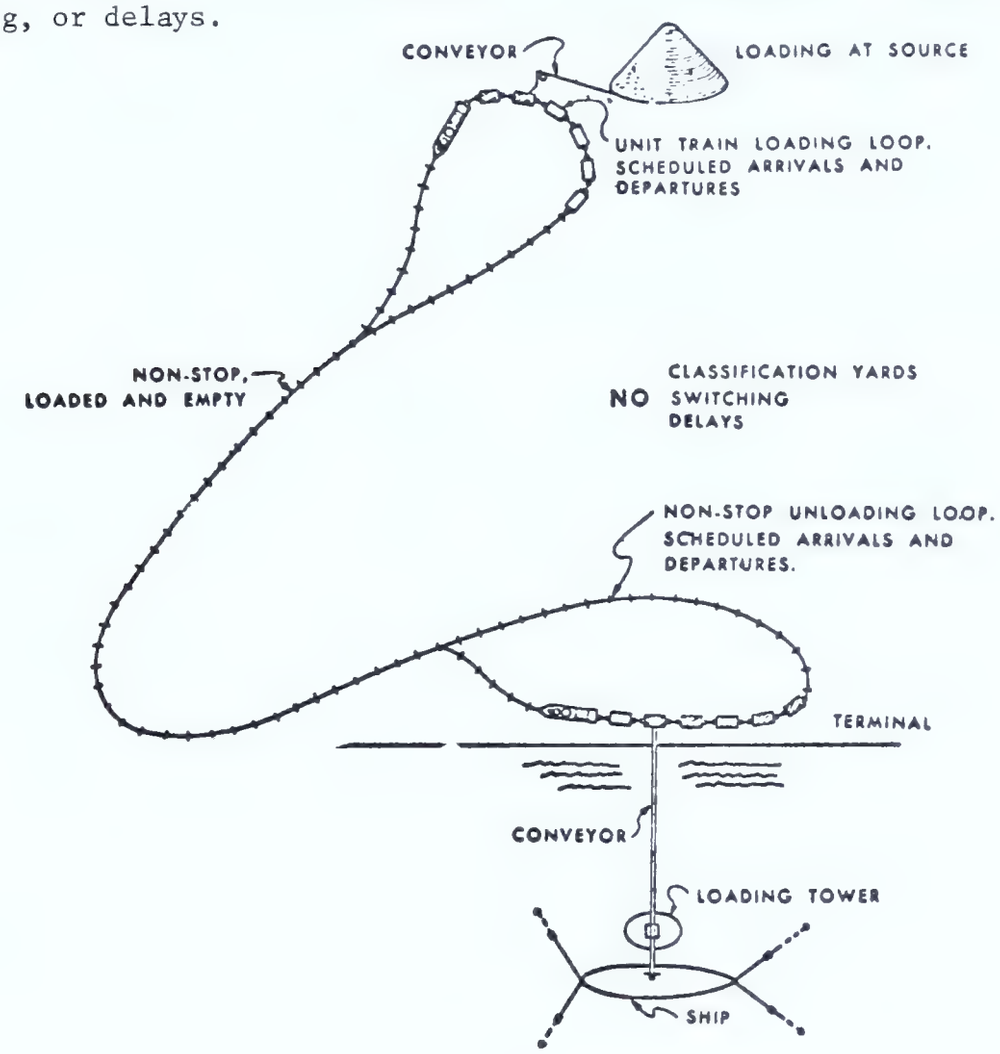


FIG. 4.—DIAGRAM: UNIT TRAIN OPERATION

O-002

O'Brien, J.P.
SUPERSONIC TRANSPORT EFFECTS ON AIR-TRAFFIC CONTROL. Astronautics & Aeronautics, vol. 4, August 1966, pp. 60-64.

O-003

Oglesby, C.H. and Robert Sargent.
AN ECONOMY STUDY AIMED AT JUSTIFYING A SECONDARY ROAD IMPROVEMENT. In: Studies in Highway Engineering Economy. Highway Research Board Bulletin 320. National Research Council. National Academy of Sciences, Washington, D.C., 1962, pp. 12-23.

Since many feeder and secondary roads are presently being improved often without determining whether or not the expenditures represent the best use of the funds available, a post-mortem study was made of a 2.935 mile link in San Mateo County, California. One purpose of the study was to see whether or not sound economy studies could be made from data currently available, and if not, what data would be needed. For example, maintenance costs for the old road were lumped in as poart of a large road unit and could be segregated only by proportion. The results are given in six tables. The study revealed many voids or uncertainties in the data available and nine suggestions are made to remedy these. The procedure may be used for studying similar situations.

O-004

O'Mara, J.J.
ELECTRONIC GUIDANCE FOR HIGHWAY SAFETY. Civil Engineering (NY), vol. 34, no. 10, Oct. 1964, pp. 38-40.

The need for research to develop mechanical and electronic controls for cars on arterial roads is emphasized and a method of electronic control outlined in which cars would be guided by cables buried in the center of lanes or by other cables which would provide for access, egress, and passing. Safe intervals are maintained by electronic devices that can act on engines and brakes. The increased use of mass traffic media is also recommended.

O-005

Oppenlander, J.C.
THEORY OF TRAFFIC FLOW-STATISTICAL MODELS. Purdue Univ.-Eng. Extension Ser.-Eng. Bul. 116, 1964, pp. 121-32.

The theory of traffic flow is explained and several statistical models are shown that were developed to describe various traffic-stream characteristics. Models of statistical estimation and of hypothesis- or significance-testing type are described.

O-006

Overgaard, K.R.
URBAN TRANSPORTATION PLANNING: TRAFFIC ESTIMATION. Traffic Quarterly, vol. 21, April 1967, pp. 197-218.

An outline for the urban transportation planning process with a general description of the four phases in the traffic estimation procedure: trip generation, trip distribution, modal split, and traffic assignment. The author has taken a method (the so-called Wayne Arterial Assignment Method) and applied it to a Danish city. This has been done to examine the Wayne method in general and its relationship to the equal travel times principle in particular. The computer program as actually written from the Danish data deviates somewhat from the Wayne method. The question of whether the Wayne method or its modification do actually reflect the manner in which traffic is distributed over alternate routes is left open. This article is a summary of

the author's doctoral dissertation published in full in Acta Polytechnica Scandinavica, Civil Engineering and Building Construction Series no. 37, Copenhagen, 1966.

O-007
Owen, Wilfred.
THE METROPOLITAN TRANSPORTATION PROBLEM. The Brookings Institution, Washington, D.C., 1966 (rev.).

A consideration of the problems of metropolitan transportation including the growing demands of the automobile, the role of mass transportation in speeding the movement of urban and suburban dwellers, dealing with the old patterns of urban living and focusing attention on the need for a comprehensive approach to urban mobility. The author examines the problem of urban mobility as a whole and explores some of the inter-relationships between transport development and urban living. The objective is to determine the requirements of public policy by exploring a program of metropolitan-wide planning, financing, and coordination of all methods of transportation. It is stressed that attention be focused on the very important need to keep the demand for transportation within bounds by control of population densities and land uses, and balancing of developed land with open spaces. Hence an effective urban transportation program involves redevelopment of cities and planning of new suburbs to permit urban living to keep pace with changing technology and economic growth.

O-008

Owen, Wilfred.
PIPELINE TRANSPORT. In: Strategy for Mobility. The Brookings Institution, Washington, D.C., 1964, pp. 106-109.

The pipeline is particularly practical for traversing difficult terrain and transporting fuels at low unit costs. It is practically unaffected by weather and has few maintenance problems. Operating costs per unit of traffic are one-third as much for a 20-inch pipe as for a 10-inch pipe. Large volumes of liquid with the approximate characteristics of petroleum can be moved through a pipeline at a cost equal to one-third the cost of barge transport, one-fourth to one-eighth the cost of rail transport, and one-sixth to one-eighth the cost of trucking.

O-009

Owings, N.A.
URBAN TRANSPORTATION PLANNING CONCEPTS. Traffic Quarterly, vol. 21, April 1967, pp. 179-183.

A broad-spectrum concept team has been organized by top officials of the transportation agencies of Maryland, the Bureau of Public Roads, and the city of Baltimore. The basic concept under which the team will operate is that of high-density urban mobility, and the program will include the elimination of certain industrial areas in Baltimore which are believed to generate more pollution than taxes, while simultaneously breeding slums and crime. The tools by which the program is to be designed include: application of several psychiatric-oriented disciplines; and coordination of the activities of traffic analysts, engineers, and planner-architects to produce an integrated set of transportation and public and private construction and action programs along some 20 miles of Baltimore-area freeways.

P-001

Pearson, G.B.
V/STOL AIRPORT CUT DELIVERY TIME, INCREASE PRODUCT AVAILABILITY IN 500-MILE RANGE. SAE-Journal, vol. 74, June 1966, pp. 76-7.

P-002

Pegrum, Dudley F.
TRANSPORTATION: ECONOMICS AND PUBLIC POLICY.
R.D. Irwin, Homewood, Illinois, 1963. 625 pp.

Each of the five main sections of this book is designed to be self-contained, although each part is built upon the preceding one to avoid repetition. Part I deals with transportation as an economic activity and with its place in the economy. Part II sets forth basic economic principles and then applies them to an analysis of the structure of the agencies comprising the transportation system of the country and their significance to competition, monopoly, and organization. The pricing process is given special attention. Part III deals with regulation and is presented historically, because present arrangements and policies constitute a continuous development from the beginning of regulation with little discard of what has been done. Details have been kept to the minimum and key issues and the steps taken to deal with them are emphasized. Part IV deals with the issues of private enterprise in transport. An attempt has been made to deal with these objectively. Part V deals with the problems of metropolitan transportation.

P-003

Pendleton, W.C.
EMPIRICAL STUDY OF CHANGES IN LAND USE AT FREEWAY INTERCHANGES.
Traffic Quarterly, vol. 19, no. 1, Jan. 1965, pp. 89-100.

The use of aerial photographs, in assembling data on changes in land use, is discussed and findings from a study of land development around 64 freeway interchanges is presented. Data are also used to illustrate and test a simple model incorporating variables expected to be useful in explaining observed rates of change. The study was limited to interchanges on highways designed and constructed with full access control.

P-004

Penn Jersey Transportation Study.
1975 PROJECTIONS: FOREGROUND OF THE FUTURE. PJ Reports,vol. 2.
Penn Jersey Transportation Study, Philadelphia, Pa., 1964.

The second of a series of general reports for the Penn Jersey region. It presents the short range transportation plan, considers the questions of urban growth and policy, the functions of long and short range planning, and describes forecasting methods. It shows: detailed projections of population, income, and employment; land development in the region; regional distribution of future growth under such aspects as residential development, district income projection, non-residential land development. Numerous maps, charts, and tables are available in addition to appendices containing land-use projections.

P-005

Penn Jersey Transportation Study.
1975 TRANSPORTATION PLANS. PJ Reports, vol. 3. Penn Jersey Transportation Study, Philadelphia, Pa., 1965.

The third of a series of general reports concerning transportation in the Trenton-Philadelphia-Camden region. The 1975 geographic, socio-economic, demographic and land-use projections (vol. 2), were used to forecast the structure of 1975 travel patterns and travel demands. Six alternative transportation plans are presented for consideration, including highway and mass transportation facilities, public and private. The methods by which these plans were developed and the tests used to determine the most adequate regional transportation system are given. An evaluation of 1975 plans follows.

P-006

Penn Jersey Transportation Study.
P J PAPERS. NOS. 1-23. Penn Jersey Transportation Study, Philadelphia, Pa. Various dates. 1960-1965.

A series of 23 working and policy papers. The following contain material of interest to students of regional economics and transportation problems, with special reference to the Philadelphia metropolitan complex:

no. 18 - Regional Data
no. 22 - Report on the Activities Allocation Model
no. 23 - The Economic Context of 1985 Transportation Costs in the PJ Region.

P-007

Penn Jersey Transportation Study.
POPULATION PROJECTION SYSTEM. Technical Report, no. 3. Penn Jersey Transportation Study, Philadelphia, Pa. 1965.

A population projection system is described in this report which produces projections by age, race, and sex groups for five year time intervals as far into the future as desired, and distributes these to subareas within the region for which base period data are available. It requires appropriate age-sex data for subareas over at least one census decade, and regional or national birth and mortality data for the same groups. The system is programmed for digital computers and a number of program options permit experimentation with alternative sets of assumptions respecting birth and death rates, migration, and distributional tendencies between subareas.

P-008

Penn Jersey Transportation Study.
THE STATE OF THE REGION. PJ Reports, vol. 1. Penn Jersey Transportation Study, Philadelphia, Pa., 1964.

A comprehensive survey of the state of the Penn Jersey region, a nine-county metropolitan area centered around the cities of Camden, Philadelphia and Trenton (Philadelphia, Delaware, Chester, Montgomery and Bucks counties in Pennsylvania; and Camden, Mercer, Burlington and Gloucester counties in New Jersey). Its history and background, topography, detailed data on socio-economic characteristics, demography, amount and nature of travel, and the transportation facilities in the region (with emphasis on the rail and highway systems as of 1960) are presented. Its purpose was

to provide facts and inter-relationships of today's region for extrapolation to 1975 and eventually beyond. Numerous maps, tables, charts and statistics are available.

P-009

Pennsylvania Department of Highways.
1972 TO 1985 NEEDS STUDY FOR PENNSYLVANIA: AN ENGINEERING STUDY OF HIGHWAY NEEDS FOR PENNSYLVANIA FROM 1972 TO 1985. Department of Highways, Commonwealth of Pennsylvania, Feb. 1967.

Future highway needs are projected for Pennsylvania highway systems (10 classes) annually, from 1972 to 1985. Estimated expenditures are presented for the various categories of highway improvement, i.e., relocation, reconstruction, widening, and resurfacing. Annual travel figures are projected and expressed as millions of vehicle miles at five-year intervals from 1967 to 1985. The predicted annual travel in 1985 will be about double that of 1967 for all systems. Maps and projections of travel are provided for each class of highway system.

P-010

Pennsylvania Department of Highways.
SIX YEAR IMPROVEMENT PROGRAM, JULY 1, 1967 - JUNE 30, 1973, vol. 1. Department of Highways, Commonwealth of Pennsylvania, 1967.

The Pennsylvania State Highway Commission recommended: renewal of the Six Year Program for 1971-72 and 1972-73 in the amount of $1.35 billion for highway improvement projects; an increase of $120 million over previous authorizations, for the elimination of hazardous conditions and the improvement of school bus routes; and an additional increase of $30 million to provide for increased costs of projects. The financial plan is presented by district and analyzed by source, rate, and revenue. The appendix provides an inventory of suggested highway improvements.

P-011

Pennsylvania Department of Highways.
SIX YEAR IMPROVEMENT PROGRAM, JULY 1, 1967 - JUNE 30, 1973, vol. 2. Department of Highways, Commonwealth of Pennsylvania, 1967.

The projects recommended for the Six Year Improvement Program are identified. 8,500 projects with a total cost of over $13.4 billion are suggested for immediate programming. $1.3 billion of the $13.4 billion inventory of Suggested Highway Improvements have been selected for the new Fifth and Sixth years of the continuous Six Year Improvement Program. The projects from the initial Six Year Program that are not under construction are called Carry-Over Projects. Each district is analyzed as to the Carry-Over Program and the New Fifth and Sixth Year Program and information: county, traffic route, name and location, type and length of improvement, and cost in millions of dollars are given. A map of the district plotting the various programs is provided.

P-012

Pennsylvania Department of Highways.
SIX YEAR IMPROVEMENT PROGRAM, JULY 1, 1967 - JUNE 30, 1973, vol. 3. Department of Highways, Commonwealth of Pennsylvania, 1967.

A complete survey of all State highways to identify hazardous locations has identified accident cluster locations, hazardous school bus routes, and other hazardous locations, identified by district engineers. A Safety Improvement Program, requiring the expenditures of $111 million of the requested $120 million over a three year period, is presented, broken down by district and by the factors previously cited. An appendix lists the projects by district.

P-013

Pennsylvania Department of Highways.
THE U.S. DEPARTMENT OF TRANSPORTATION: A STUDY OF ITS CREATION, ORGANIZATION AND RESPONSILITIES. Harrisburg, Pennsylvania, Aug. 16, 1967.

Agencies and functions transferred out of other Federal governmental units into the Department of Transportation are listed. The organization and the responsibilities of the constituent offices and agencies are shown in a chart. Federal agencies having regulatory functions in this area are listed as are the standing committees of Congress. Biographical information of key personnel is given. President Johnson's message to Congress of March 2, 1966 proposing the creation of a Department of Transportation is summarized and the Act creating it is traced through its hearings and final passage. A number of states have initiated or taken action in the field of transportation: California, Hawaii, New Jersey and Wisconsin have already created state Departments of Transportation. New York has passed legislation to form such a department with the stated aim that planning and development of efficient transportation facilities will be coordinated by the Department with responsibility for balanced transportation policy and planning. The organizational structure of New Jersey's Department of Transportation is described.

P-014

Pennsylvania Economy League.
IMPROVED TRANSPORTATION FOR SOUTHEASTERN PENNSYLVANIA. Prepared for Pennsylvania Department of Commerce and Study Commission of the Philadelphia Metropolitan Area. Bureau of Municipal Research and Pennsylvania Economy League, Philadelphia, 1960. 468 pp.

This study includes the physical, historical and legal background for the area; including the road plan itself and the deficiencies of Pennsylvania's laws which hinder highway development, the principal defect being that our highway laws are cast upon a framework of responsibility according to arbitrary political divisions. The elements of good road planning and the actual procedures followed for state, federally aided, suburban county, city of Philadelphia, municipal, and regional planning agencies are described. Interaction between the road system and mass transportation is considered under the aspects of mass transit using road systems, commuter railroad service, government revenues and expenditures attributable to mass transportation, the tax situation, and coordination of road and mass transportation planning. The pattern of construction and maintenance of southeastern Pennsylvania highway facilities followed by the state and by the suburban counties is discussed under the aspects of physical inventory, legal base, financing and equipment. A local 5-area study (covering 9 municipalities in Southeast Bucks, 6 in Greater Norristown,

13 in East Central Delaware, 6 in Greater West Chester, and 7 in Central Chester) of road construction and maintenance procedures, and the state, suburban, local and Philadelphia patterns for financing road programs, with their legal bases, sources of revenue, and expenditures, is given. Appendices include a statutory source digest of source materials on Pennsylvania Highway Law as of Jan. 1, 1959 and statistical data on roads in southeastern Pennsylvania, together with 40 detailed tables.

P-015

Pennsylvania Economy League.
PARKING IN PHILADELPHIA'S NEIGHBORHOODS: A STUDY OF POLICIES AND STANDARDS FOR RESIDENTIAL PARKING FACILITIES IN PHILADELPHIA. Pennsylvania Economy League (Eastern Division) in association with the Bureau of Municipal Research, Philadelphia, Pa., 1966.

A study of the parking problem in Philadelphia, with valuable appendices that include statistics on: 1960 Philadelphia car ownership, relationship between household income and car ownership, residential density and car ownership, availability of mass transportation and car ownership; U.S. car ownership as related to income 1949-63, car registrations in Philadelphia between 1946 and 1963, the Penn-Jersey Study forecast of automobile ownership in Philadelphia, distribution of Philadelphia's parking problems in 1962 by census tract; summary of provisions of the Philadelphia zoning code of 1962 with respect to off-street residential parking; car ownership by types of housing; cost and utilization of city parking facilities in residential areas.

P-016

Pennsylvania Economy League.
TRANSPORTING PUPILS TO THEIR SCHOOLS. Pennsylvania Economy League (Eastern Divion) in Association with the Bureau of Municipal Research. Report no. 343. Philadelphia, 1967.

A study of three different ways of transporting pupils, made for the Philadelphia Board of Education. School District ownership, maintenance, and operation of all equipment was the first possibility; full performance on a contract basis was the second; and a mixed operation (in any proportion) was the third. The estimated costs for these various means providing services are given. The advantages and disadvantages of each variation are discussed.

P-017

Pennsylvania Economy League.
URBAN TRANSPORTATION IN PENNSYLVANIA. Pennsylvania Economy League, State Division. Harrisburg, Pennsylvania, December, 1966.

Presents an analysis of the transit facilities of strictly urban mass transportation in Pennsylvania, including the two commuter railroads, 3 bus-rail combinations and 77 bus carriers, of which only the 35 in the state which have revenues in excess of $100,000 a year and which do over 97% of the urban mass transit business in the state are analyzed in detail. Statistics show that the decline in mass transit ridership may be leveling off and that, although ridership is declining, revenues have increased slightly due to increases in fares. Fixed-route scheduled service accounted for 95% of the income of the local transit systems, excluding railroads, in 1964. An analysis of financial statistics for the system indicates that the urban mass transit industry is not financially able to avoid further reductions in service nor to attract the capital with which to rebuild itself. Among the problems

of the industry is that nearly half of the buses in the state (excluding PTC) are over 15 years of age and many of the smaller bus companies buy either some or all of their buses in used condition. Wages and salaries account for more than 60% of the operating costs of the companies and this ratio is rising. Urban transit facilities are subject to Federal, state and local taxes as well as PUC assessments. While tax relief for the operators in Pennsylvania is being considered and some reductions have occurred, a well thought out and equitably planned aid program is thought able to provide more help. Reduced rates for school children are regarded as a burden and bus companies complain that the practice of separating responsibility for public and school transportation prevents them from getting contracts which would be useful to them and also hinders the cause of mass transportation planning. Planning for mass transportation in the state is apparently limited almost exclusively to the Philadelphia and Pittsburgh areas. Responsibility for programs is divided among many state agencies: The Department of Community Affairs, Department of Highways, Department of Public Instruction, Public Utility Commission, Pennsylvania Aeronautics Commission, Bureau of Traffic Safety, Bureau of Motor Vehicles, State Police, Pennsylvania Turnpike Commission, State Highway and Bridge Authority. Federal and state assistance funds have been made available and the Federal Government provides funds for acquisition, construction, research and demonstration, and training and scholarship programs. Funds may not be used for current operating expenses. The Commonwealth assists with both capital and operating funds, and both programs require local matching. Local programs are also in existence and several large transit companies have been taken over by public ownership. The authority to act for acquisition of necessary transportation facilities in Southeastern Pennsylvania is lodged in SEPTA. Recommendations of the Committee fall into four groups: organization, planning, financial assistance, special problems. A state level organization, (a department of transportation) to oversee coordinated mass transportation in the state is recommended. It would assume the duties of the Department of Highways and other organizations scattered throughout the state government. Local governments should also be permitted to establish county or inter-county departments of transportation. The program should be set up to take full advantage of the federal programs although not dependent upon or copied from them and local financial participation should be a requisite. The elimination of local taxes should be a condition for direct aid. Special transportation problems such as school transportation fares should be set up on a fair and equitable basis and local planning and regulation of traffic must allow free and rapid movement of rapid transit and mass transit vehicles.

P-018

Pennsylvania, General Assembly of.
SENATE BILL NO. 1129: Session of 1967. Introduced by Fleming, R.D., et al. Printer's No. 1308, Pa., 1967.

A bill authorizing the Department of Community Affairs to administer certain grant programs for the betterment of mass transportation systems throughout the Commonwealth. Grants could be made to municipalities, counties or other instrumentalities for studies, research, demonstration projects, purchase of service projects, and capital improvement projects. This bill is titled "Pennsylvania Urban Mass Transportation Assistance Law of 1967." Referred to the Committee on State Government on August 28, 1967.

P-019

Pennsylvania, General Assembly of.
SENATE BILL NO. 1130. Session of 1967. Introduced by Fleming, R.D. et al. Printer's No. 1308, Pa., 1967.

A bill to create the Pennsylvania Transportation Assistance Authority with power to acquire, construct, improve, equip and lease transportation assistance projects, and to fix the rentals, fees and charges for the use thereof. Includes authority to issue and to repay bonds and various other provisions which are related to joint ownership with governmental units, exercise of eminent domain, etc., in pursuit of the major purposes of the bill.

P-020

Pennsylvania. University. Institute for Environmental Studies.
AN INTRODUCTION TO URBAN TRANSPORTATION PLANNING; EMERGING TECHNIQUES AND THEORIES, by Anthony R. Tomazinis. Institute for Environmental Studies. University of Pennsylvania, Philadelphia, Pa., 1967. (mimeographed).

An analysis of urban transportation planning, discussing its evolution and general framework, the emerging techniques and their theoretical settings, including: travel demand analysis, formulation of future alternative systems, evaluation of urban transportation systems, etc.

P-021

Perle, E.D.
THE DEMAND FOR TRANSPORTATION: REGIONAL AND COMMODITY STUDIES IN THE U.S. Research Paper 95. Dept. of Geography, University of Chicago. (in preparation - April 1967).

P-022

Phillips, Charles F.
THE ECONOMICS OF REGULATION: THEORY AND PRACTICE IN THE TRANSPORTATION AND PUBLIC UTILITY INDUSTRIES. Richard D. Irwin, Inc., Homewood, Illinois. 1965.

After an introduction describing the place of regulated industries in the American economy, the author traces the economic, legal, and administrative concepts of regulation and the theory behind such regulation. The regulated industries are then described by structure and history. Regulation and the transportation industry, and public policy and the transportation industry are discussed and there is an appraisal of the concept of regulation.

P-023

Phillips, David K. and Stanley Woolman.
SYSTEMS ANALYSIS APPROACH TO PROCESSING OF VEHICULAR TRAFFIC RECORDS FROM CONTINUOUS-COUNT STATIONS. Highway Research News, no. 13. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., June 1964, pp. 55-70.

A description of an ADP system used to process traffic counts from a cordon traffic survey system in use in Manhattan. The purpose of the processing procedure is to develop a systems approach to the study of hourly, daily and monthly traffic patterns, in addition to selected traffic volume characteristics by geographic areas, by highway systems, by classes of urban streets, by state highway districts, etc. Two other considerations were to permit routine checks for reasonableness of collected data and to provide means for graphic presentations for traffic pattern and research studies.

P-024

Pittsburgh Chamber of Commerce. Urban Transportation Council.
FIRST INTERNATIONAL CONFERENCE ON URBAN TRANSPORTATION: PROCEEDINGS. HELD FEB. 1-3, 1966. Urban Transportation Council. Pittsburgh Chamber of Commerce, Pittsburgh, Pa., 1966.

The official proceedings including addresses and panel discussions at the first International Conference on Urban Transportation. Several of the important topics covered were: needed innovations, including a lighter railway car weighing 15-20% that of existing rapid transit cars, which would operate above ground by computer, carrying 30 or fewer passengers; a panel discussion on the university as a source of research, instruction, and public service in urban planning and the establishment of research centers for this purpose and an announcement of the opening of such a center at Carnegie-Mellon University; first steps towards the solution of transportation problems in particular locations in Atlanta, Pomona, Philadelphia, and St. Louis; and inter-Governmental cooperation for better transit, in the spheres of land use planning and transportation planning.

P-025

Pittsburgh Chamber of Commerce
SECOND INTERNATIONAL CONFERENCE ON URBAN TRANSPORTATION: PROCEEDINGS. Held April 17-19, 1967. Pittsburgh Conference on Urban Transportation. Pittsburgh, Pennsylvania, 1967.

P-026

Pogust, F., A. Kuprijanow and H. Forster.
MEANS OF LOCATING AND COMMUNICATING WITH DISABLED VEHICLES: INTERIM REPORT. National Cooperative Highway Research Program Report 6. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964.

The nature and the extent of the disabled or stopped vehicle problem is discussed with reference to frequency and causes and their relation to highway types, kind of assistance desired and how this assistance could be rendered. Mathematical models have been developed to relate the available information and to bridge gaps in the data. Existing detection techniques including those involving surveillance by air-

craft, passing motorists, or mechanical, pneumatic, visual, optical, acoustical, infrared, electrical and magnetic principles are discussed. Applications are discussed on various trypes of highways along with estimated cost. In the appendixes mathematical models are developed for: simplified patrol analysis, patrol post analysis, safety analysis and value to the motorist analysis. (31 figures and 14 tables).

P-027

Port of New York Authority.

A FRAMEWORK FOR TRANSPORTATION PLANNING. In: Metropolitan Transportation - 1980. Comprehensive Planning Office, Port of New York Authority, pp. 3-6.

The history of civilization as shaped by transportation is discussed, emphasizing the impact of technological development. When different modes of transportation are viewed closely, certain common trends can be observed: the values derived from transportation are not limited to those enjoyed by its users; there is a profoundly important dichotomy in transportation: private and public; all forms of transportation must cope with a strong rhythm in demand; all modes of transportation show a wide disparity between high speeds and relatively low costs in interterminal operations, and time consumed and high costs experienced in the terminal areas. The most outstanding trends in the New York Metropolitan Region are growth of population in the outlying areas developed at low land-use density, and decline in the older more densely developed neighborhoods.

P-028

Port of New York Authority.
METROPOLITAN TRANSPORTATION - 1980: A FRAMEWORK FOR THE LONG-RANGE PLANNING OF TRANSPORTATION FACILITIES TO SERVE THE NEW YORK-NEW JERSEY METROPOLITAN REGION. Comprehensive Planning Office, The Port of New York Authority, New York, 1963.

P-029

Prescott, Earl.
THE CRITICAL PATH METHOD. Photogrammetric Engineering, vol. 33, no. 3, March 1967, pp. 324-330.

The Critical Path Method (CPM; PERT) for scheduling and project monitoring has the same advantages for photogrammetric mapping as it does in other industries. The system provides a display of all the activities for project planning and for continuous management control for the duration of the project, as well as data which may be needed for compressing work schedules at least cost. Graphic network models help identify the critical elements of an operation, show how they can best be modified or rescheduled as the work progresses in order to overcome unexpected delays, or to take advantage of unexpected early completions. The elements include aerial photography, control surveys, photogrammetric bridging and adjustment, stereoplotting, mosaics, drafting, editing, etc. A computer is used to prepare a monitor report that shows project status.

P-030

Price, N.C.
ASTRA SYSTEM FOR MODERNIZATION OF AIR TRANSPORTATION. Heat Transfer Thermodynamics & Education-Boelter Anniversary Vol., 1964, pp. 404-14.

The Astra proposal is aimed at discretely planned steps for the institution of an invariable, continuous flow network of completely automated transport missile trajectories between urban center vertiports. These would contain all ground operations within a highly mechanized building, part of which may include a number of basement floors. A suitable transport missile must have the combination of necessary compactness and directionally controllable planing ability in atmosphere. A typical Astra vehicle having VTOL capability, employs a wingless, tail-less fuselage which is conical at the forward end.

P-031

Priest, R.V.
STATISTICAL RELATIONSHIPS BETWEEN TRAFFIC VOLUME, MEDIAN WIDTH, AND ACCIDENT FREQUENCY ON DIVIDED-HIGHWAY GRADE INTERSECTIONS. Highway Research News, no. 13. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., June 1964, pp. 9-20.

A total of 975 accidents were tabulated to develop charts that are now used to estimate the number of accidents which will occur at given grade intersections in future periods, to correct for influence of volume differences when comparing one grade intersection accident rate with another, and to correct for influence of traffic exposure when comparing median width with accident frequencies.

P-032

Primakov, Yu. V. and V.M. Fyodorov.
POSSIBILITIES OF USING DIRIGIBLES IN CONSTRUCTION. Monatazhnye i Spetsialjnye Raboty v Stroiteljstve, no. 1, Jan. 1966, p. 1820. Journal of the American Concrete Institute, vol. 64, no. 2, Feb. 1967, p. 111.

This article deals with the advantages of using dirigibles for construction of reinforced concrete and steel structures, for repair of existing works, and for transportation of building materials in general, especially in out-of-the-way places. The advantages of the dirigibles for this type of work are their high lifting power, long cruising range, and maneuverability. They also are capable of hovering in a more stable manner than helicopters. It is particularly noted that dirigibles are useful in overland transportation of very large objects which could not be handled by any other means. Notable advances in the construction of dirigibles has taken place in the United States since the end of World War II. There are freight dirigibles with a payload of 24-300 tons and a range of 800-3000 miles at a cruising speed of 75 mph.

P-033

Prisk, C.W.
WHAT'S WRONG WITH THE BEST HIGHWAYS IN THE WORLD?
Public Works, vol. 97, May 1966, pp. 127-9.

P-034

Pulling, R.W.
INTERCITY TRAVEL CHARACTERISTICS. ASCE Proceedings, vol. 91, (J. Aero-Space Transport Division), no. AT1, Apr. 1965, paper 4296, pp. 1-13.

An hypothesis is presented and a scientific model is proposed to aid engineering planners in forecasting travel between city pairs in United States. It is shown that proximity of one city to another, distance between cities, and size of city affect travel. Economic factors such as individual worth and city classification, i.e., industrial, marketing, institutional, or balanced, also influence travel.

P-035

Purnell, J.S.
PLANNING TRANSPORTATION FACILITIES TO GUIDE URBAN DEVELOPMENT.
Traffic Quarterly, vol. 20, no. 2, April 1966, pp. 277-87.

Demographic statistics are discussed in relation to trends in urban growth and transportation planning. A comprehensive regional planning study by the Southwestern Regional Planning Commission, which examined a number of alternative regional development patterns for a six-county Pennsylvania area in Southwestern Pennsylvania that encloses Pittsburgh, develops approaches that can be applied generally to any urban region in the country. The author states that there are alternatives, which are discussed in depth, to the continuation of low-density suburban growth in regional cities, corridor communities, and regional towns. Common goals and standards for selecting a development pattern are suggested and various alternative regional development patterns are evaluated in terms of these goals for properly integrated transportation facilities.

P-036

Putman, Stephen H.
MODELING AND EVALUATING THE INDIRECT IMPACTS OF ALTERNATIVE NORTHEAST CORRIDOR TRANSPORTATION SYSTEMS. In: Transportation System Analysis and Evaluation of Alernate Plans. Highway Research Record, no. 180. Highway Research Board. National Academy of Sciences, Washington, D.C., 1967, pp. 81-93.

This paper describes the model system and evaluation techniques used by the Consad Company to evaluate the indirect impacts of alternative Northeast Corridor transportation systems. The impact model system consists of two sub-models: IRIO, an interregional input-output model, and INTRA, an intraregional allocation model. The problems of selecting an evaluation measure are also described. Since the models had not yet been completed, much of the text is devoted to an exposition of alternative evaluation measures and their uses within the overall project.

P-037

Putman, Stephen H.
MODELS FOR DETERMINING INDIRECT IMPACTS OF HIGH SPEED GROUND TRANSPORTATION SYSTEMS; NORTHEAST CORRIDOR. Consad Research Corporation, Pittsburgh, Pa., 1967.

The development of a set of models to determine the interaction between alternate transportation facilities and the economic, demographic and physical environment of the Northeast Corridor both in toto and by subarea is described. The basic conceptual framework involves the comparative advantages for the locations of existing and changing accessibilities brought about by changes in transportation facilities. The logic is simple: to be able to describe the consequences or effects for different regions or subregions, estimates of economic or population activity must be forecast for these areas. Mathematical models are used to make these forecasts. A figure is given which shows the logical sequence of impact measurement and another gives the analytical methods or model types used by areal and effects categories.

Q-001

Quinby, H.D.
MAJOR URBAN CORRIDOR FACILITIES: A NEW CONCEPT. Traffic Quarterly, vol. 16, April 1962, pp. 242-59.

A limited tramline is proposed as an intermediate solution to interurban transportation. It would serve best for short trips (8-20 miles). The tramline could have reserved rights-of-way or use existing streets for all or parts of its route. Examples of similar systems now in existence are given. The proposed tramline would be a three-section articulated vehicle type and could take advantage of any existing grade-separated rights-of-way; in urban cores it could operate in reserved malls or segregated streets. New technology in car design, track construction, and maintenance is described. Car design is discussed in detail. For efficient traffic flow, fares are paid while the vehicle moves. Warrants, capabilities and costs are presented in some detail.

Q-002

Quinby, H.D.
TRANSPORTATION FOR SUPER-REGIONS. Traffic Quarterly, vol. 17, July 1963, pp. 325-40.

R-001

Rapp, J.
COST ALLOCATION REVISITED. Highway Research News, no. 17. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., Feb.1965, pp. 11-24.

A critical evaluation and analysis of solutions for dividing costs of highway improvement program between highway users and general public and property owners. Types of solutions examined include those dealing with cost allocation between users and nonusers and those dealing with cost allocation among various classes of users.

R-002

Reuss, H.S.
BREAKTHROUGH IN NEW URBAN TRANSPORT SYSTEMS. Traffic Quarterly, vol. 20, Jan. 1966, pp. 21-30.

The Mass Transportation Act of 1964 can only provide help for cities to purchase new buses or subway cars. What is needed is for the Federal Government to sponsor research to develop new systems which will provide the urban population with good public transport. Although the Federal government has appropriated $90 million to develop new modes of highspeed intercity transport and has initiated a program for supersonic air transport which could cost $1 billion, we are not making a comparable effort to develop a system of moving people within our cities rapidly, safely, and efficiently. The author is Member of the House from Wisconsin, Fifth District.

R-003

Richard, Hoy A. and J.D. Jones, Jr.
APPLICATION OF MOTOR CARRIER CONTINUOUS TRAFFIC STUDY TECHNIQUES TO THE ASSEMBLY OF INTERCITY FREIGHT TRAFFIC DATA. In: Freight Transportation Economics. Highway Research Record, no. 175. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967, pp. 15-26.

A description is presented of the Southwestern Motor Freight Bureau Continuing Traffic Study of December 1964. Traffic flow analysis reports were compiled from a random sample of approximately 90,000 sampled freight bills, and these reports yielded, in addition to a descriptive analysis of intercity freight traffic movement between metropolitan areas, coefficients for use in estimating total movements of goods by common carriers of general commodities between specified standard metropolitan areas. Four report forms are presented to show the manner in which intercity traffic flow data may be assembled for analysis.

R-004

Richards, E.J. and I.J. Sharland.
HOVERCRAFT NOISE AND ITS SUPPRESSION. J. Roy Aeronautical Society, vol. 69, no. 654, June 1965, pp. 387-98.

Reference is made to the 1963 Wilson "Committee on the Problem of Noise" and recommendations made therein referring to Hovercraft are discussed. The possible noise sources in Hovercraft include: propellers, lifting jet and turbojet efflux, lifting fans, compressers and turbines on turbojet and turboshaft engines, gearbox and

transmission systems and piston engine exhausts. A review of the research program at the Institute of Sound and Vibration Research at Southampton University and an examination of noise control principles and design factors reducing noise sources in these areas are included. 23 refs.

R-005

Richards, Oscar W.
VISION AT LEVELS OF NIGHT ROAD ILLUMINATION XII, LITERATURE 1966. In: Night Visibility. Highway Research Record, no. 179, Highway Research Board, National Research Council, National Academy of Sciences, Washington, D.C., 1967, pp. 61-67.

92 references are given and their major results and findings are discussed. Eye physiology, the effect of auto design, eyeglass design, drugs and visibility of signs are some of the topics considered.

R-006

Roberts, Merrill J.
TRANSPORTATION COSTS, PRICING, AND REGULATION. In: Transportation Economics. National Bureau of Economic Research, Special Conference 17. National Bureau of Economic Research, New York, 1965, pp. 3-42.

Transport rates should be related to incremental rather than to "full" costs. Rates should be geared to demand conditions rather than to cost allocation formulas. Market-oriented rates pass muster reasonably well in terms of significant economic criteria. They are not inimicable to viable investment levels or to interagency traffic allocations consistent with efficient distribution patterns. Rates not fettered by regulation to full-cost criteria can produce economic results just as satisfactory as those realized from the operation of the price system in the economy generally. Commission regulation is apt to dustrust these results and to stifle market forces in key cases by inappropriately gearing competitive rates to fully distributed costs. We need to understand demand better in order to regulate price. Only broad-scale research can help us. We might expect insights then that will allow us to regulate transport prices or not do so and yet produce tolerably efficient allocations.

R-007

Roberts, P.O. and J.H. Suhrbier.
HIGHWAY LOCATION ANALYSIS: AN EXAMPLE PROBLEM. M.I.T. report 5. M.I.T. Press, Cambridge, 1966. 94 p.

New and computer-oriented analysis and techniques have been developed for use in the location, design, and economic study of highway systems. This paper illustrates the use of some of these tools in the location of a short segment of new interstate highway (Interstate Route 495) near Franklin, Massachusetts. The report presents the most significant findings of the study: the decision-making scheme so that certain interrelationships between the various cost-producing variables in the highway link location problem are clearly indicated; methods of maximizing computer use in the performance of engineering analysis for the location and design of highway links; a description of computer models and data presentation techniques available for these analysis; a methodology for dealing with the uncertainty inherent in transportation system problems. The steps in the process included: prelocation planning; procurement of terrain data; the Digital Terrain Model (DTM) location system, and design system; volumetric quantities; structures; pavement;

drainage; right-of-way acquisition; highway maintenance costs; vehicle simulation and operating cost system; economic analysis (cost summary of lines, cost breakdown); sensitivity analysis; and a presentation of results. There are numerous illustrations throughout and pullout maps.

R-008

Roberts, Jr., P.O. and J.H. Suhrbier.
LINK ANALYSIS FOR ROUTE LOCATION. In: Engineering Economy 1963. Highway Research Record, no. 77. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 19-47.

Work done by Civil Engineering Systems Laboratory at M.I.T. to develop computer-oriented analysis methods for use in location, design and economic analysis of highway systems is described. Methods were used in a location analysis of a short segment of new interstate highway in eastern Massachusetts to aid in further development and testing of these methods. Findings of the study are as follows -- develops decision-making scheme, demonstrates methods of maximizing computer utilization in performance of economic analyses, describes some of computer models and data presentation techniques, and presents new methods of dealing with transportation systems problems.

R-009

Rogers, A.C.
DOWNTOWN PEDESTRIAN SYSTEM-INTEGRAL PART OF TRAFFIC PLAN.
Traffic Engineering, vol. 35, no. 4, Jan. 1965, pp. 20-2, 44-7.

Problems associated with the conflict between pedestrian and vehicle in downtown traffic are discussed. The percentage of land allocated to servicing vehicular features is far out of proportion to use of land for economically productive purposes, namely, functional concentration of employment, residential, recreational, and shopping uses in downtown areas. The answer to the problem may be found in a multilevel approach designed to intensify downtown development.

R-010

Ronan, William J.
SHIFTING EMPHASIS IN TRANSPORTATION. In: Shifting Emphasis in Transportation and Its Implications for Research. Highway Research Record, no. 183. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967, pp. 7-12.

New emphases in transportation are integration of the various modes of transportation into a system; recognition that it is a regional problem requiring cooperation of the various areas and that it so affects the total well-being of the community that its far-reaching effects must be foreseen and planned for. Research for a total transporation system requires that technological advances in one mode be carefully examined to see how they can affect the others. Intergovernmental cooperation linking planning research and operations of state, local and Federal agencies must be correlated, and better statistical information for planning is seen as necessary. The formation of the Federal and State Departments of Transportation is evidence that efforts are being made in this direction.

R-011

Rothery, R., et al.
ANALYSIS OF EXPERIMENTS ON SINGLE-LANE BUS FLOW. Operations Research, vol. 12, no. 6, Nov.-Dec. 1964, pp. 913-33.

Using pairs of buses, theoretical "car following models" of single-lane traffic flow are examined for this type of heavy vehicle and found to provide good representation of the detailed manner in which one bus follows another. The flow characteristics of buses were also determined by using platoons of up to ten buses. The approaches respectively showed that a single lane of buses forms a stable stream of traffic and an optimal flow of about 1450 buses/hr at a speed of 33 mph for an expressway type facility.

R-012

Royer, Jr., J.P.
VIRGINIA'S PROGRAM OF URBAN HIGHWAY PLANNING. Traffic Quarterly, vol. 21, April 1967, pp. 185-95.

Highway needs for all towns and cities of 3,500 population and up have been evaluated as part of a state-wide planning program. Before this many urban projects were built without evaluation of need. The present program still has a number of flaws, but it is the best analysis of urban highway problems yet developed in Virginia. The continuing transportation planning process required by the 1962 Federal Highway Act is now in opertion in three study areas with three other continuing processes being established.

S-001

Saunders, A.H.
OPERATIONAL EXPERIENCE AT DULLES AIRPORT. ASCE Proceedings, vol. 90 (J. Aero-Space Transport Division), no. AT2, Oct. 1964, paper 4070, pp. 53-58.

This airport was designed to avoid the problems experienced at other facilities. The land acquired is sufficient for all future expansion and should provide a noise barrier for neighboring communities. The terminal building is designed to allow the passengers to move freely from ground transportation to mobile lounges. The first year of operation is described.

S-002

Sawhill, R.B. and K.C. Crandall.
SOME MEASURABLE QUALITIES OF TRAFFIC SERVICE INFLUENCED BY FREEWAYS. In: Traffic and Operations - General. Highway Research Record, no. 49. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1964, pp. 30-63.

The benefits in the form of improvements in travel time, overall speed, delay, fuel consumption, distance, and volume for freeway bypass routes are compared to the conditions on older business routes. The effect on travel time and fuel consumption, of the freeway speed of operation and of the traffic volume, is analyzed.

S-003

Saylor, R.B.
THE RAILROADS OF PENNSYLVANIA. Industrial Research Report 4, Bureau of Business Research. College of Business Administration. Penn State University, University Park, Pa., 1964.

Each of the 40 line-haul railroads operating trains in the state is analyzed by (1) tracing its development back as a physical property and as a business enterprise; (2) describing its current operations; (3) evaluating its operating and financial record since World War I. A general appraisal of Pennsylvania railroads in the present and future is also presented.

S-004

Schmarsel, P.
TECHNIQUES FOR IMPROVING TRAFFIC FLOW. Traffic Engineering & Control, vol. 6, no. 6, Oct. 1964, pp. 361-4, 368.

The results of management techniques used for improving traffic flow in towns; the limits and possibilities of signal installations; and time/space coordination of multiple-use road surface areas by means of remote controlled illuminated traffic signs are discussed.

S-005

Schultheis, M.A.
STANDARDS IN THE AEROSPACE INDUSTRY. Magazine of Standards, vol. 33, July 1962, pp. 207-8.

The author, Hughes Company representative on the National Aerospace Standards Committee (NASC) of the Aerospace Industries Association, describes the function and scope of the Committee. In the 20 years of its existence it has generated more than 1,350 industry standards and specifications. No flight vehicle or airborne equipment has been in the U.S. inventory since World War II which has not had a considerable number of NASC parts.

S-006

Severy, D.M., H.M. Brink and J.D. Baird.
SCHOOL BUS PASSENGER PROTECTION. Society of Automotive Engineers, (485 Lexington Ave., New York, N.Y. 10017) Paper 670040, Jan. 1967. 165 pp.

Three full-scale collision experiments involving a school bus were conducted, using research techniques and engineering methodology designed to provide realistic and objective findings relating to school bus passenger safety. The experiments conducted were (a) a head-on collision between two fully loaded, moderate-sized school buses, each traveling 30 mph; (b) a stationary bus rear-ended by a passenger car traveling 60 mph; and (c) a stationary bus impacted on its right side by a passenger car traveling 60 mph. The following categories relating to passenger injury causatio were studied: location and type of impact, structural integrity of vehicles, vehicle size, seat design, type of restraint or force moderator, type of safety glass, passenger size, standing versus seated passenger, passenger kinematics and interactions, forces sustained by passengers and many related factors.

S-007

Shapiro, N. and H. Drell.
COMMUNITY NOISE CHARACTERISTICS OF SUPERSONIC TRANSPORT. SAE-Paper 650213 for meeting Apr. 12-15, 1965. 6pp.

The community noise characteristics of subsonic jet aircraft resulted in stringent acoustical objectives for supersonic transport. The achievement of 108 PNdb (perceived noise level) takeoff objective constituted a significant portion of the total design effort on SST. It is possible to provide an airplane that produces less community noise than present jets by use of engines with airflows of three to four times that of existing subsonic jet engines, but with low velocities resulting in low jet noise, and by providing aircraft with outstanding takeoff and climb-out performance.

S-008

Shelton, J.R.
INDUSTRIAL ENGINEERING AT PORT OF NEW YORK AUTHORITY. J. Industrial Engineering, vol. 15, no. 5, Sept.-Oct. 1964, pp. 272-76.

The emphasis is on operational studies using various techniques of traditional operations research, mathematics, statistics, transportation economics, engineering administration and economics. Studies have been conducted to develop operations and maintenance cost estimates, to analyze construction plans, to evaluate manpower and main-

tenance requirements, to determine traffic flow patterns through high level aerial photography, and to study transportation facilities through simulation and waiting-line techniques.

S-009

Siekman, P.W.
UNIT TRAIN FROM CONSUMER'S STANDPOINT. ASME-Paper 65-RR-1 for meeting Apr. 7-8, 1965. 7 pp.

A privately owned, 7000-ton unit train which is hauling coal from mines to power plants in Pennsylvania is described. This is the first train to use equipment especially built for a unit coal train. The paper discussed factors which were considered in selecting equipment and outlines the benefits and problems involved in ownership and use of a unit train.

S-010

Simpson and Curtin.
IMPROVED TRANSIT SERVICES FOR METROPOLITAN ERIE: PREPARED FOR ERIE METROPOLITAN TRANSIT COMMISSION. Simpson and Curtin, Philadelphia, Pa., 1966.

This study includes: an assessment of the present plant of the Erie Coach Company; population projections for Erie and surrounding areas by five year increments to 1990 (shown in the table on the next page); projected land activity and rate of land development for the area; employment projections for 1990, based on the Urban Renewal Programs for the area, showing city and area increases; projected auto ownership through 1990. Some conclusions are that public transport is an important secondary system in Erie and measures should be taken to halt the decline of the system and to supply public funds to support a reasonable level of activity. An eleven point program for implementation of the study includes recommendations for establishing a public transit authority, applying for Federal Assistance for new equipment, improving service and promoting the use of the facility and extension of service into the fast-growing outer areas of the metropolitan region.

TABLE X

POPULATION PROJECTIONS BY 5-YEAR PERIODS

Erie Urbanized Area

Including Population Density per Gross Acre

	City of Erie	Millcreek Township	Harborcreek Township	Lawrence Park Township	Wesleyville Borough	Erie Urbanized Area	Population Density Per Gross Acre: City of Erie	Population Density Per Gross Acre: Outside City Limits	Population Density Per Gross Acre: Total Area
1950	130,803	17,037	7,475	4,154	3,411	162,880	12.61	0.69	2.87
1960	138,440	28,441	10,569	4,403	3,534	185,387	13.35	1.01	3.27
1965	139,100	31,100	11,700	4,800	3,650	190,350	13.41	1.10	3.36
1970	142,500	34,000	12,700	5,100	3,800	198,100	13.74	1.20	3.49
1975	151,500	37,100	13,900	5,500	4,050	212,050	14.61	1.30	3.74
1980	162,700	41,000	15,400	6,000	4,400	229,500	15.69	1.44	4.05
1985	171,200	47,700	17,900	6,800	4,800	248,400	16.51	1.66	4.38
1990	175,000	60,000	28,000	7,000	5,000	275,000	16.87	2.16	4.85

S-011

Slayton, W.L.
URBAN RENEWAL AND MASS TRANSPORTATION PLANNING. Traffic Quarterly, vol. 16, January 1962, pp. 5-13.

The need for cooperation in urban planning is stressed. Urban transportation is only one aspect of a total problem. The conclusion is reached that state governments are the logical places for leadership in urban planning. They can make state development policy, create statewide comprehensive plans, pass legislation permitting interjurisdictional action, act as arbiters and catalysts and provide technical and financial assistance. Federal aids for urban planning are discussed briefly. Projects of the Urban Renewal Administration, Bureau of Public Roads, and the Housing Act of 1961 are outlined.

S-012

Smerk, G.M.
URBAN TRANSPORTATION: THE FEDERAL ROLE, Indiana University Press, Bloomington, 1964.

An analysis of urban transportation and of the role the federal government should play, in the light of the history and present status of urban transportation. Contents include discussions of transport modes and urbanization, the roots of the urban transportation problem and alternative solutions, congestion, the Federal-Aid Urban Highway Program and Federal aid to urban mass transport, the traffic peak and the pricing problem, benefit-cost analysis, and the future role of the federal government.

S-013

Smith, Bob L.
GRAVITY MODEL THEORY APPLIED TO A SMALL CITY USING A SMALL SAMPLE OF ORIGIN-DESTINATION DATA. In: Travel Patterns. Highway Research Record no. 88. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 85-115.

The feasibility of using the gravity model was studied, using a small clustered sample of interviews in Hutchinson, Kansas: population 37,000. The model was used to estimate trip production, trip attraction, and travel time factors. In addition, a gravity model was calibrated using origin-destination productions and attractions and the resulting distribution was used in the comparison of results. Interviews were conducted from 402 dwelling units in 14 selected zones. The complete origin-destination survey was made up of 2,528 interviews obtained from a 20% sample of dwelling units from the 83 zones in the area studied. Although the study was concerned with present traffic rather than with estimating future traffic, the author suggests that the method may be useful for estimating future traffic.

S-014

Smith, G.W.
BENEFIT-COST RATIOS: A WORD OF CAUTION. In: Highway Economics, Highway Research Record, no. 12. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963, pp. 77-90.

The benefit-cost ratio is widely used in the evaluation of capital expenditure proposals for public projects for the purpose of comparing alternative designs. By means of examples, the author cites examples which, he states, reveal fallacies in this method and advises caution because its administration will cause some high-yield projects to be delayed or denied because funds have been exhausted in some low-yield projects.

S-015

Smith, W.S.
TRANSPORTATION PLANNING. ASCE Proceedings, vol. 93, (J. Urban Planning and Development Division), no. UP2, June 1967, paper 5265, pp. 93-143.

A discussion of factors to be taken into account by, and techniques available to, urban transportation planners. Copiously illustrated by examples from numerous studies.

S-016

Smith, Wilbur S.
TRAFFIC AND TRANSPORTATION IN URBAN RENEWAL. Civil Engineering, vol. 30, Oct. 1960, pp. 45-47.

Urban renewal cannot by itself revitalize a decaying central business district, but needs traffic- and transportation planning to handle the additional load. Conversely, various aids to transportation may even exert a negative effect on a city unless coordinated with urban renewal. An example of such coordination is provided by New Haven, Philadelphia, Los Angeles and a number of other cities. Elements entering into a development of a master plan for transportation and urban renewal are listed.

S-017

Smith, Wilbur S.
TRANSPORTATION CENTERS. ASCE Proceedings, vol. 91, (J. Urban Planning and Development Division), no. UP1, July 1965, paper 4396, pp. 19-29.

Advocates a coordinated system of terminals or transportation centers that facilitate the functioning of the transport system by providing simple, convenient, comfortable, fast, and economical opportunities to accomplish a travel mode change. Various statistics are given considering passenger transportation needs and destinations and travel preferences and how these may be best accommodated through a terminal facility. Drawbacks such as the tendency of such a facility to create pedestrian congestion problems and the large space required are considered. Means of providing quick and easy personnel movement and automation of ticket operations must be parts of any terminal operation. Coordination with suburban centers, with parking provided, can facilitate integration of suburbs with the center city as focal point. Some freight interchange may be provided at off-peak hours in the

central terminal but specialized circumferential centers, which can consolidate freight movement into and out of the city and which may be integrated with air-freight movements, are seen able to reduce congestion by reducing urban truck travel.

S-018

Smith, Wilbur S.
URBAN TRANSPORTATION TASKS OF THE FUTURE. ASCE Proceedings, vol. 88, (J. of the Highway Division), no. HW1, May 1962, paper 3120, pp. 21-28.

Strong social and economic forces in urbanized areas of the U.S. create changes in the patterns of land use and population distribution and will have long-range effects on future transportation needs. Highway and transit facilities must be carefully coordinated. Urban transportation needs vary widely but a balance in modes is sought. The determination of the mode of future urban travel is the most difficult aspect of transportation studies. Urban transportation must be a system of transportation, adaptable to change. The individual needs and capacities of each community must be considered. Recasting governmental structures to permit effective transportation planning in large urbanized areas is one of the greatest problems. The professional disciplines must have a plan of cooperation with definition of the role of each agency.

S-019

Smith, Wilbur S., and Associates.
FUTURE HIGHWAYS AND URBAN GROWTH. Wilbur S. Smith and Associates, New Haven, Conn., 1961.

This study analyzes the usage and impacts of the National System of Interstate and Defense Highways, particularly as related to urban areas. It indicates transportation needs of future urban areas, and predicts the use and benefits to be derived from the Interstate system. Appendixes include present and proposed rapid transit facilities in Philadelphia and other cities. Tabular information is presented for Pittsburgh and other study areas on trips, existing and future travel, passenger car use, etc.

S-020

Smith, Wilbur S. and Associates.
PARKING IN THE CITY CENTER. Wilbur Smith and Associates. Under Commission from The Automobile Manufacturers Association, New Haven, Connecticut. May, 1965.

S-021

Soltman, Theodore J.
SELECTED BIBLIOGRAPHY FOR TRANSPORTATION PLANNING.
Pittsburgh Area Transportation Study, July 1965 (revised).

Over 1000 entries intended to serve as a guide to various aspects of metropolitan and regional transportation.

S-022

Soros, P.
HIGH CAPACITY SHIPLOADING SYSTEM GEARED TO IMMEDIATE TRAIN TURN-AROUND. ASME-Paper 64-WA/MH-4 for meeting Nov. 29-Dec. 4, 1964. 8 pp.

A new coal terminal at Conneaut, Ohio is designed to eliminate railroad car waiting time at a port by routing material through ground storage when necessary. Ground storage is also utilized to permit continuous railroad operation during the winter navigation shutdown on the Great Lakes. The engineering of the system included; a designed monthly capacity of 2 million tons, a shiploading rate of 7000 tph and a one-and-a-half million ton capacity stockpile, incorporating both bucket wheel and gravity reclaiming.

S-023

Sosslau, Arthur B., K.E. Heanue and A.J. Balek.
EVALUATION OF A NEW MODAL SPLIT PROCEDURE. In: Travel Patterns. Highway Research Record, no. 88. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 44-68.

The new modal split technique was developed to estimate the 1980 transit requirements of metropolitan Washington, D.C. A two-phase test was conducted. In the first phase the effectiveness of the new modal split procedure was tested for its ability to reproduce a known situation. In the second, sensitivity (ability to reflect changes in input variables) was assessed. The results tended to confirm the usefulness of the procedure but a number of limitations were revealed; these need study before further application. Comments by three transportation planning officers are included.

S-024

Southeastern Pennsylvania Transportation Authority.
SEPTA. SEPACT II-DEMONSTRATION PROJECT. MARKETING REPORT NO. 3. PHILADELPHIA METROPOLITAN AREA REPORT 106 (D): RIDERSHIP SURVEYS OF PENNSYLVANIA RAILROAD COMMUTER LINES-LEVITTOWN, CHESTNUT HILL, MANAYUNK AND PAOLI LINES AND ALL READING RAILROAD COMMUTER TRAINS OPERATING IN SOUTHEASTERN PENNSYLVANIA. Three Volumes. Philadelphia, November, 1966.

This report is in three volumes. Volume I contains the narrative and the findings, volume II the statistical presentation for the Paoli, Manayunk, Pottstown, Norristown, P.R.R. -Chestnut Hill, Reading Co. -Chestnut Hill and Glenside Lines; and volume III the statistical presentation for the Quakertown, Doylestown, Lansdale, Hatboro, West Trenton, Newton and Levittown lines. The surveys were conducted to determine and analyze the current rail travel patterns and number of riders in order to establish a basis with which future comparisons can be made; to predict on the basis of available economic and demographic information the size and extent of the market for each line in order to help determine SEPTA's long-range, regional program; to define the task of developing the market; and to ascertain the number and nature of the problems in the minds of the riders and to evaluate any trends in public acceptance. The railroad lines and the method (postage paid questionnaires) used are described and maps and summaries of findings by each line are provided. In general it was found that the location of the destination in the city determined the choice of the rail carrier when competitive rail service was available. Fare and/or speed did not seem to have the total influence sometimes ascribed to them. Furthermore, the destination in the city governs the choice of travel-to-work mode from suburban areas. Very few traveled by foot or by transit more than 10 minutes

away from their arrival point. This time factor apparently exists throughout the region. Most rail users live in rather narrow corridors along the rail lines although there are some predictable angles of approach. Parking facilities are scarce at many locations. Three lines have very high percentages of riders who walk to the station (Manayunk 71.1%, Chestnut Hill P.R.R. 50.9%, and Chestnut Hill Reading 47.6%).

S-025

Speas, R.D. and H.P. Schmidt.
INFLUENCE OF V/STOL AIRCRAFT ON AIRPORT DESIGN. ASCE-Proceedings, vol. 90, (J. Aero-Space Transport Division), no. AT2, Oct. 1964, paper 4096, pp. 167-80.

Because, in some categories of air transportation, V/STOL aircraft will be much more competitive with fixed wing aircraft in the future they must be considered as a factor in airport design. V/STOL operations can be considered for use on short-haul, high-traffic routes. Airports for V/STOL aircraft must be located near population centers, which makes them expensive and subject to criticism over resulting noise.

S-026

Speas, R.D. and L. Simpson
FORECAST OF AIR TRANSPORT FOR 1980. ASCE Proceedings, vol. 88, (J. Aero-Space Transport Division), no. AT1, Aug. 1962, paper 3240, pp. 63-75.

Continued growth in the volume of air travel with further advances in long-range aircraft, for which the SST is specifically designed, will require ground facilities to accommodate aircraft of increased overall dimensions, passenger capacities, fueling requirements, weight, and takeoff and landing distances. Several avenues of aircraft development should be considered: (1) subsonic, (2) supersonic, (3) VTOL, which, because of economic and technical problems, is not considered to be a potential factor by 1980. The economic necessity for increasing airport capacity and aircraft utilization and minimizing ground handling time will affect the design of aircraft handling and operating facilities. Factors are given for the airport planner in preparing for transcontinental air transport of 1980. Graphs indicate historical trends in seating capacity, cruising speeds, dimensions of aircraft, fuel capacity, and runway length.

S-027

Special Study Group on Transportation Policies in the United States.
NATIONAL TRANSPORTATION POLICY; PRELIMINARY DRAFT OF A REPORT PREPARED FOR THE COMMITTEE ON INTERSTATE AND FOREIGN COMMERCE, UNITED STATES SENATE. (DOYLE REPORT). U.S. Government Printing Office. Washington, D.C., 1961.

A comprehensive report on various aspects of U.S. national transportation policies and trends in transportation including the following: national transportation policy as implied by legislative acts through 1958; transportation trends and projections to 1975; organization of Government for transportation; organization of transportation law; specified items of Senate Resolution 244, including regulation of transportation, government assistance and user charges, ownership of one mode of transportation by another, consolidations and mergers, the future of intercity railroad passenger service, long and short haul, and the provision of public car-

rier service in rural areas; transportation pricing; and additional specific matters such as taxation of way, Government transportation, private carriage of freight, exemption from regulation, enforcement of economic and safety regulations; urban transportation including the rail commutation problem, requirements of mass transportation by private automobile, planning metropolitan passenger transportation, piggyback and containerization, labor and management in transportation, implication of Government regulation of service, the national rail freight car problem, etc.

S-028

Squire, Harris
WHAT'S NEW IN PIPELINING. Speech at the Transportation Management Program. Stanford University, Stanford, California, June 6, 1965.

A discussion of various new applications of pipeline transportation including transport of butane, propane and ethane gas; solids in the form of slurries of wood chips, coal or gilsonite; solids in the form of capsules of solid material; "people pipelines" for transporting people at extraordinarily high rates of speed through capsule pipelines. Technological advances made in the industry, e.g. larger diameter pipes, automation of operations, permit new applications for the cheap transport of large volumes of material which other forms of transport could not handle.

S-029

Stanford Research Institute.
ECONOMIC PRINCIPLES FOR PRICING AIRPORT SERVICES. Prepared for Air Transport Association, South Pasadena, Calif. Southern California Laboratories, Stanford Research Institute, 1961.

Sound principles for pricing airport services should be based on a differentiation between primary and secondary airport functions. The soundest pricing policy for airport operators rests on the primary product - byproduct theory of pricing. Communities receive significant and increasing benefits as a result of the operations of airports, and they must decide the amount of local subsidy. The most satisfactory method of financing airport development is the type of general obligation bond that requires airport revenue to be earmarked for bond retirement. The actual collection of fees and charges may be assessed to either the airlines or the passengers although the passenger ultimately bears the cost. The lack of a uniform system of accounts makes comparison of costs and revenues of various airports extremely difficult and suggests a need for a uniform system of accounts for airports.

S-030

Stanford University. Graduate School of Business.
TRANSPORTATION AND TOMORROW, edited by Karl M. Ruppenthal and Henry A. McKinnell, Jr. Stanford University, Stanford, California, 1966.

S-031

Steger, W.A.
REGIONAL TRANSPORTATION STUDY, SOUTHWESTERN PENNSYLVANIA REGION, by Consad Research Corporation. Pittsburgh, Pa. (in preparation - April 1967)

S-032

Steger, W.A. and F.M. Graves.
INTERVENTION OF COMMONWEALTH OF PENNSYLVANIA IN JOINT APPLICATION FOR MERGER OF THE PENNSYLVANIA RAILROAD COMPANY AND THE NEW YORK CENTRAL RAILROAD COMPANY. Digest of Statement Before the Interstate Commerce Commission. Finance Docket no. 21989. Pittsburgh, Pa., 1963.

The economic effects upon the Commonwealth of the formation of the Pennsylvania-New York Central Transportation Company were analyzed with the aid of a simulation model of the railroad. Input consisted of information about freight carried, physical characteristics, and operations. The methodology of the study consisted of the computer model, background research studies for preparation of inputs and analysis of outputs, and evaluation of claims by proponents and adversaries of the merger. Conclusions of this analysis were: The merger applicants did not examine the specific transportation costs had the Pennsylvania main line been chosen for the bulk of consolidated traffic through the State of Pennsylvania must include tabulation of the necessary fixed investments as well as the traffic (transportation) costs that would be associated with this path; estimates of schedule changes to accommodate the traffic that would be flowing east-west should be made, in order to test whether the Pennsylvania option proved suitable for shippers in New York State; the proportion of cost incurred as a result of moving trains over the Pennsylvania mountains should be estimated more carefully than has been the case to date; the correlation, if any, between rail traffic and employment should be more completely explored - no provable damage to industrial development in Pennsylvania, under the proposed New York State option, has been demonstrated, although the industrial "access coefficients" indicated potentially significant comparative advantage to New York industry under this option.

S-033

Steger, Wilbur A.
THE PITTSBURGH URBAN RENEWAL SIMULATION MODEL. Journal of the American Institute of Planners, vol. 31, no. 2, May 1965, pp. 144-150.

This report summarizes the current status of the digital computer simulation model for urban renewal decision-making purposes which is concerned with the various aspects of measurement and prediction of the cumulative effects of urban renewal decisions over time. The four steps in accomplishing this are discussed. Component factor analysis is used. The model consists of over 30 computer routines, the purposes of which are described. Data and information management and policy design are discussed. The need for improvement in construction and validation is mentioned.

S-034

Steger, Wilbur A. and T.R. Lakshmanan.
PLAN EVALUATION METHODOLOGIES: SOME ASPECTS OF DECISION REQUIREMENTS AND ANALYTICAL RESPONSE. A paper prepared for Highway Research Board Conference on Urban Development Models held at Dartmouth College, New Hampshire. Consad Research Corp., June 1967.

A methodological review and critique, in which the past, present, and probable future status of the "evaluation and choice" phase of the overall planning process is analyzed by placing it in the context of the overall process; and suggested methods for achieving what evaluators of public choices would like to accomplish.

S-035

Stein, K.J.
TRAFFIC CONTROL OF ADVANCED SST STUDIED. Aviation Week, vol. 86, May 22, 1967, pp. 79-82.

The most needed avionic developments for safe, economical supersonic aircraft are emerging from studies at NASA's Electronic Research Center, which is oriented toward the SST. These include major advances in avionic subsystems, subsystem integration, and air traffic control systems, communications, guidance and navigation, flight instrumentation, and data management.

S-036

Stephenson, Henson K., J.S. Noel, and A.D. Mayfield.
TRUCK WEIGHT TRENDS RELATED TO HIGHWAY STRUCTURES.
Texas Transportation Institute, College Station, Texas, 1962.

S-037

Stevens, Hoy.
LINE-HAUL TRUCKING COSTS IN RELATION TO VEHICLE GROSS WEIGHTS.
Highway Research Board Bulletin 301. National Research Council. National Academy of Sciences, Washington, D.C., 1961. 136 pp.

The methodology for adjusting cost factors for differences in prices paid for fuel, wages, fringe benefits, depreciation and interest charges, and new vehicles is shown. The data are reported in an extensive series of charts showing the variations in vehicle-mile costs by loaded gross weight for all the 23,384 trailer combinations, all the gasoline engine powered trailer combinations, all the diesel engine powered combinations, and by groups of types of trailer combinations using either gasoline or diesel engines. Other charts and tables show how unit costs are affected by body type, type of terrain, average daily travel mileage, average load speed, and other operating variables.

S-038

Stevens, Hoy.
LINE-HAUL TRUCKING COSTS UPGRADED, 1964. In: Line-Haul Trucking Costs and Weighing Vehicles in Motion. Highway Research Record, no. 127. Highway Research Board. National Academy of Sciences, Washington, D.C., 1966, pp. 1-21.

Highway Research Board Bulletin 301, published in 1961, is updated to 1964. The report presents the line-haul operating costs for highway freight vehicles operating on rural highways where consistant road speeds are attained for terminal-to-terminal operations. Data are presented to facilitate the investigation of the overall economic advantages which might result from permitting higher axle and gross weights for motor freight trailer combinations and to evaluate these facilities with greater load-carrying capacities. Vehicle operating costs are presented in terms of vehicle-miles and payload ton-miles, and in relation to gross weight trailer combinations. Methods and sources for updating the 1961 data are presented. Summation-of-costs charts are given showing both gross operating costs in relation to loaded gross weights of trailer combinations and a breakdown of the various cost factors. Tables present cost reductions possible by increasing vehicle gross weights.

S-039

Stowers, J.R. and E.L. Kanwit.
THE USE OF BEHAVIORAL SURVEYS IN FORECASTING TRANSPORTATION REQUIREMENTS. In: Economic Forecasting. Highway Research Record, no. 106. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966, pp. 44-51.

Gives findings and implications of a nationwide behavioral survey, by the University of Michigan Survey Research Center, or urban households in which recent residential moves, travel habits, socioeconomic characteristics, and preferences regarding the choice of residential location and mode of travel were analyzed for their bearing on urban transportation.

S-040

Stratford, Alan H.
THE PROSPECTS OF LOWER AIRLINE AND AIRPORT COSTS.
J. Royal Aeronautical Society, vol. 69, no. 659, November 1965, pp. 749-755, DISCUSSION, pp.755-758.

A paper read at a symposium on Cheap Short Range Air Transport. Among the specific areas discussed are: airline costs and revenue, indirect operating costs, international collaboration, cost savings made possible by technical pooling and agreements, the effect of airline size, the shuttle (a summary of the economics of the shuttle service operated by Eastern Airlines between Boston, New York and Washington), airport costs, cargo loading at airport terminals, and other sources of cost saving.

S-041

Stroup, Robert H., L.A. Vargha and R.K. Main.
PREDICTING THE ECONOMIC IMPACT OF ALTERNATE INTERSTATE ROUTE LOCATIONS. In: Indirect Effects of Highway Improvement: 1962. Highway Research Bulletin 327. National Research Council. National Academy of Sciences, Washington, D.C., 1962, pp.67-72.

The central problem in the investigation was to predict the quantitative effects of each alternate location on highway-oriented business currently along a major route parallel to a proposed one. The method involved the use of the concept of an economically neutral road as a standard by which the alternative locations could be judged. The effects were measured in terms of the business volume projected to 1975 with the aid of data from a specially designed origin-destination study, a motel survey, a restaurant survey, national park statistics, and gross receipts and income data. Each alternate route was compared with the neutral road on various bases: access, visibility of establishments, advertising restrictions, and anticipated driver behavior.

S-042

Stufflebeam, George T.
THE TRAFFIC DICTIONARY. Simmons-Boardman, New York, 1950 (rev.).

A handbook of domestic and foreign trade and transportation terms, phrases, and abbreviations.

S-043

Sutton, R.M.
FUTURE TRENDS, SHIPPER TO TERMINAL. SAE - 2nd International Forum for Air Cargo. Proceedings May 26-28, 1964, p. F1-22.

The study of distribution problems starts with an examination of volumes shipped by destination, shipment size, order characteristics, physical distribution costs, and service requirements. Some methods which shippers and carriers developed are indicated. The economics of air cargo ground handling and control, an approach to a cost problem based on assumptions for the 1968 to 1975 period; the effects of aircraft type, of shipment size and weight, the indirect operating expense and the benefits of containerization are discussed. The determination of terminal costs is included.

S-044

Systems Analysis and Research Corp.
PUBLIC BENEFITS PROVIDED BY THE LOCAL AIRLINE INDUSTRY; A REPORT ON THE NATION'S FAST-GROWING LOCAL AIRLINE INDUSTRY. Report no. 4. Prepared for the Association of Local Transport Airlines. Cambridge-Washington, 1965.

The public benefits provided by the local transport airlines continued to increase after 1963, although federal funds remained the same in 1963 and 1964. Part I of this study reports the services and other benefits provided by the local air carrier industry for the communities, passengers, commerce, postal service, and national defense. Part II provides summaries for 13 local airlines in mainland U.S., of the areas and scopes of routes system and operations. Service provided, passengers carried, and other characteristics are shown for each. In addition, numerous graphs, route system maps and summary tables provide the reader with an over-all knowledge of each carrier's operations, including present and future aircraft fleet.

S-045

Systems Analysis and Research Corporation.
PUBLIC BENEFITS PROVIDED BY THE LOCAL AIRLINE INDUSTRY. Report no. 5. Prepared for the Association of Local Transport Airlines, Washington, D.C., April 1967.

Part I of this study describes the services and other benefits provided by the local carriers in the continental U.S. for the communities, the passengers, the postal service and national defense. The public benefits of local airline service are increasing as indicated by the increased number of route miles and cities served, and the increased number of plane miles and seat miles. The local airlines have continued to improve service in the smaller cities and have reduced public service payments. Part II describes the operations of the U.S. local carriers in Alaska, Hawaii and the Caribbean. Part III summarizes for each of the 13 local continental carriers the area and scope of its route system and operations.

T-001

Tedrow, Joseph H.
TEDROW'S REGULATION OF TRANSPORTATION; PRACTICE AND PROCEDURE BEFORE THE INTERSTATE COMMERCE COMMISSION, by Marvin L. Fair and John Guandolo. 6th ed. William C. Brown Co., Dubuque, Iowa, 1964. (rev.)

T-002

Thiel, Floyd I.
HIGHWAY INTERCHANGE AREA DEVELOPMENT. In: Indirect Effects of Highway Location and Improvements. Highway Research Record, no. 96. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 24-45.

A review of research conducted or sponsored by various state highway and planning agencies. The following conclusions are drawn: Local initiative and state action on the interchange problem are needed. There are numerous problems of land-use near the interchanges of controlled-access highways but it is agreed that the economic opportunities created by interchange construction should be utilized. The complexity of this problem is demonstrated by the fact that some interchanges with little economic development are congested, whereas others handle traffice satisfactorily, the largest problem being varying amounts of traffic some distance away which rely on the interchange for access. There is no agreement on whether state or local governments should be responsible for guiding development in interchange areas or on the general type of landuse control. As for legal techniques, only the power of eminent domain and the police power have received much use along highways, and the use of both together appears to be best. The appendix reports a number of interchange and land-use control studies in a number of states.

T-003

Thiel, Floyd I.
SOCIAL EFFECTS OF MODERN HIGHWAY TRANSPORTATION. In: Indirect Effects of Highway Improvement: 1962. Highway Research Board Bulletin 327. National Academy of Sciences, Washington, D.C., 1962, pp. 1-20.

A review with 82 references. The social effects of highways on users and non-users, the effects of mobile and drive-in services, of public services, and of opportunities for employment on recreation, on residential patterns, and similar topics are considered. For example, in the discussion of the effects of highways on residences such topics as the effect of depressed highways, of elevated highways, and the interrelationships between higways and urban blight, are discussed.

T-004

Thompson, A.W.
EVOLUTION AND FUTURE OF AIRPORT PASSENGER TERMINALS. ASCE Proceedings, vol. 90, (J. Aero-Space Transport Division), no. AT2, Oct. 1964, paper 4064, pp. 127-134.

The increase in air transportation has led to substanial change in the function and design of airport terminals. The need to limit passenger-walking distances has led to the development of the satellite concept in combination with mobile lounges and moving sidewalks. Due to the growth of airport passenger terminal design developments in the United States, the growth of commercial air transportation is reviewed.

T-005

Thompson, H.L.
FREIGHT RATE EQUATIONS. Industrial and Engineering Chemistry, vol. 52, November 1960, Suppl. 44A-48A.

Equations that express unit freight rates as a function of length of haul are derived. Their applications to industry and the implications of these equations for the analysis of distribution of freight by mode of transportation are discussed briefly.

T-006

Thompson, James A. and B. I. Fansler.
ECONOMIC STUDY OF VARIOUS MOUNTING HEIGHTS FOR HIGHWAY LIGHTING. In: Night Visibility. Highway Research Record, no. 179. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1967, pp. 1-15.

The cost-effectiveness of various luminaire mounting heights and methods of evaluating alternate lighting designs were studied. Lighting designs with mounting heights of 40-50 ft. were found to be more economical and effective than the usual 30 ft. mounting height. (9 charts and 13 references)

T-007

Tivark, R.
A PREDICTIVE MODEL OF ECONOMIC GROWTH AT NON-URBAN INTERCHANGE SITES ON PENNSYLVANIA INTERSTATE HIGHWAYS. Pennsylvania State University. (in preparation - April 1967)

T-008

Tollefson, Harold M.
TRANSIT TAX KEEPS BUSES ROLLING IN WASHINGTON STATE. Nation's Cities, vol. 5, no. 6, June 1967, pp. 9-10.

Tacoma and Yakima, Washington, have adopted a new method of supporting their financially-troubled transit systems. Approved by the people at the polls, this new method is a transit tax or transit stand-by charge. Every housing unit and business concern pays a specified monthly amount as a means of subsidizing the bus system whether they use it or not. In 1966 Yakima approved a lease-management agreement with a transit system with a 65-cent monthly transit tax, with Tacoma following suit with a 75-cent monthly tax. Although the crisis is temporarily over, the subsidy requirement continues to grow, and an over-all solution is desired.

T-009

Tondel, L.M.
NOISE LITIGATION AT PUBLIC AIRPORTS. Journal of Air Law & Commerce, vol. 32, no. 3, Summer 1966, pp. 387-407.

T-010

Torrey, Richard F.
TRANSPORTATION FACTORS IN PLANT LOCATION. Rubber Age, vol. 97, no. 3, June 1965, pp. 86-87.

A blueprint for the conduct of a preliminary transportation availability study is presented. It is stated that such studies are necessary for the purpose of properly evaluating the adequacy of proposed plant sites.

T-011

Traffic Service Corporation.
A GLOSSARY OF TRAFFIC TERMS AND ABBREVIATIONS. Prepared by E. Albert Ovens. Traffic Service Corporation, New York, 1967.

T-012

Transportation Association of America.
DOT: DEPARTMENT OF TRANSPORTATION; A SUMMARY OF ITS ORGANIZATION, EXECUTIVE POSITIONS, RESPONSIBILITIES. Washington, D.C., April 1967.

A list of the agencies and functions transferred to DOT, job descriptions of the executive positions, together with an organizational chart and pictures of the holders of the positions. Biographical information of key personnel is also included. The chart is based upon the substance of the legislation and is not official.

T-013

Transportation Association of America.
REPORT. Transportation Association of America. Washington, D.C., 20036.

A monthly comment on matters of interest to the field of transportation, together with material of organizational interest and descriptive matter on the activities of the Association.

T-014

Transportation Association of America.
TRANSPORTATION: FACTS & TRENDS. Fourth edition. Transportation Association of America, Washington, D.C., April 1967.

Information is limited to general data on such topics as: importance of transportation in the economy, transportation outlays vs. the gross national product, the estimated national freight bill, the estimated passenger bill, economic trends vs. the gross national product, the estimated national freight bill, the estimated passenger bill, economic trends vs. transportation trends 1939-1966, transportation vs. general price trends, intercity freight by modes, intercity travel by modes, federal and state taxes derived from transportation. The regulatory agencies are described and sources of the statistical data given. Quarterly supplements are published to maintain currency.

T-015

Transportation Association of America.
TRANSPORTATION RESEARCH. Fifth edition. Transportation Association of America, Washington, D.C., 1966.

A survey based on a questionnaire distributed in academic, industrial, and governmental circles, of current and proposed transportation research projects of a "policy-type" nature, with major emphasis on economic or other social scientific studies. Replies received show 197 projects under way, 232 recently completed studies, and 65 areas for investigation. The material is indexed under 13 major subject headings.

T-016

Transportation Association of America.
WHAT'S HAPPENING IN TRANSPORTATION. Transportation Association of America, Washington, D.C.

A one-page digest of currently reported news issued biweekly. The material is presented under the headings of: air, general, highway, pipeline, rail, and water.

T-017

Transportation Consultants, Inc.
AIDS AVAILABLE FOR COMPATIBLE LAND USE PLANNING AROUND AIRPORTS. Prepared for the Federal Aviation Agency. Transportation Consultants, Inc., Washington, D.C., June 1966. AD 650-271.

The aids referred to are in the fields of administration and planning for airports, property acquisition and development, property regulation and conversion. Appendices include government aids available for compatible land-use planning and names and addresses of administering agencies. Also presented are models of legal and related forms to facilitate action in the various fields.

T-018

Transportation Consultants, Inc.
COMPATIBLE LAND USE PLANNING ON AND AROUND AIRPORTS. Transportation Consultants, Inc., Washington, D.C., June 1966. AD 650-267.

A guide to airport planners and executives in complying with FAR Part 151.26, FAR Part 77, and the obligations under Grant Agreements to insure compatible uses of land in the vicinity of airports.

T-019

Transportation Research Forum.
RATES AND TARIFFS-AUTOMATION'S IMPACT; REGIONAL CONFERENCE, COLUMBUS, OHIO, MAY 20 AND 21, 1964. R.B. Cross Co., Oxford, Ind., 1964.

T-020

Turner, L.R. and L. Philpot.
HIGHWAY SAFETY 1960-1965; AN ANNOTATED BIBLIOGRAPHY.
Virginia Highway Research Council, Charlottesville,
Virginia, 1966.

U-001

U.S. Army Corps of Engineers.
WATER RESOURCES DEVELOPMENT IN PENNSYLVANIA. U.S. Army Corps of Engineers, North Atlantic Division, New York, N.Y., Jan. 1967.

Information on the scope and progress of Pennsylvania water resources development by the U.S. Army Corps of Engineers including projects authorized but not started, projects underway, and those completed; work under special continuing authorities (flood control projects, etc.) regional investigations underway, for example, the Northeastern U.S. Water Supply Study; basic development investigations, and surveys underway. Maps include Pennsylvania water resources development.

U-002

U.S. Bureau of the Census.
CENSUS OF TRANSPORTATION 1963. Bureau of the Census, Washington, D.C.

U-003

U.S. Bureau of the Census.
STATISTICAL ABSTRACT OF THE UNITED STATES: 1966. (87th edition.) Bureau of the Census. U.S. Department of Commerce, Washington, D.C., 1966.

A massive annual report including more than 50 pages and nearly 100 tables on transportation. Also included are references to state data sources and to other sources of statistical information.

U-004

U.S. Bureau of Public Roads.
FEDERAL LAWS, REGULATIONS AND OTHER MATERIAL RELATING TO HIGHWAYS. Bureau of Public Roads, U.S. Department of Commerce, Washington, D.C., 1966.

U-005

U.S. Bureau of Public Roads.
HIGHWAY STATISTICS 1965. U.S. Bureau of Public Roads. U.S. Dept. of Transportation, Washington, D.C., 1967.

Statistics on a number of subjects, including fuel consumption, rates and revenues, vehicle registrations, licenses, taxes, tolls, mileage of public roads and streets, and mileage and financing of Federal aid highways.

U-006

U.S. Bureau of Public Roads.
MANUAL FOR APPLYING CRITICAL PATH METHOD TO HIGHWAY DEPARTMENT ENGINEERING AND ADMINISTRATION. U.S. Government Printing Office, Washington, D.C., Nov. 1963, 200 pp.

The origin and development of the Critical Path Method and the application of CPM in aiding the planning and control responsibilities of management are discussed. The growth and acceptance of this management technique in highway industry; and appraisal of CPM usage in various functional areas by state highway departments; and computerized CPM are covered.

U-007

U.S. Bureau of Public Roads.
MAXIMUM DESIRABLE DIMENSIONS AND WEIGHTS OF VEHICLES OPERATED ON THE FEDERAL-AID SYSTEMS. U.S. Government Printing Office, Washington, D.C., 1964.

U-008

U.S. Bureau of Public Roads.
TRAFFIC ASSIGNMENT AND DISTRIBUTION FOR SMALL URBAN AREAS. U.S. Government Printing Office, Washington, D.C., 1965.

U-009

U.S. Chamber of Commerce.
AMERICA'S CITIES: CURRENT PROBLEMS AND TRENDS. U.S. Chamber of Commerce, Washington, D.C., 1966.

U-010

U.S. Civil Aeronautics Board.
C.A.B. HANDBOOK OF AIRLINE STATISTICS. U.S. Government Printing Office, Washington, D.C., 1966.

U-011

U.S. Civil Aeronautics Board.
DOMESTIC ORIGIN-DESTINATION SURVEY OF AIRLINE PASSENGER TRAFFIC. TEN-PERCENT SAMPLE FROM JANUARY 1 THROUGH DECEMBER 31, 1962. 1962 YEAR. The Airline Finance and Accounting Conference. A Division of the Transport Association of America, Washington, D.C. [1963?]

The Civil Aeronautics Board annually compiles data on a variety of subjects of interest to the members of the Air Transport Association which, in turn, publishes them. The above compilation, cited for illustrative purposes, contains details on origins and destinations of passengers by pairs of cities. Issued in sets (at $750 / set) that contain basic and summary data on such topics as "Competition among Domestic Air Carriers", "International Origin-Destination Survey of Airline Passenger Traffic" and the study cited above, these publications are a source of statistical information in this area.

U-012

U.S. Civil Aeronautics Board.
HANDBOOK OF AIRLINE STATISTICS, 1965 EDITION. Washington, D.C., U.S. Government Printing Office, 1966.

A reference source containing a statistical description of the individual United States airlines in 1964, including comparative capacity, traffic, revenues and net income by traffic type, and data for system operations with similar data for domestic and international operations; historical statistics by carrier group, through 1964 by calendar year; traffic statistics of the certificated route air carriers by individual carrier and carrier group for the calendar years 1954-1964; similar data on income; miscellaneous air-transport data; chronologies of air-transport events; comparisons with other modes of transportation; a glossary, and a general index and an index of airlines.

U-013

U.S. Congress, Joint Committee on Printing.
CONGRESSIONAL DIRECTORY, Ninetieth Congress, first session. U.S. Government Printing Office, Washington, 1967.

This publication, "for the use of the United States Congress," and brought up-to-date soon after each Congress takes office, contains biographies of the Senators and Representatives by state, committee assignments, lists of administrative assistants and secretaries, statistical information, the organization of the Congress (speaker and his staff, clerk and his staff, etc.), and information about the executive branch and the agencies of the government. For the most part the information given consists of the titles and the names of incumbents. There is a subject listing at the beginning (table of contents) and an individual listing index. Agencies dealing with transportation are listed: e.g., the Federal Communications Commission, the Department of Transportation, the Department of Housing and Urban Development (including the Assistant Secretary for Metropolitan Development), the Federal Aviation Agency, and the Interstate Commerce Commission. The telephone number is given for the agency. The residence address is given for individuals.

U-014

U.S. Congress, Senate, Select Committee on National Water Resources.
SUPPLEMENTAL INFORMATION ON SUBJECTS COVERED BY THE COMMITTEE'S STUDIES PURSUANT TO S. RES. 48. Eighty-sixth Congress, U.S. Government Printing Office, Washington, D.C., January 1961.

This is a critical study of Committee Print No. 11, namely the report of the Corps of Engineers, U.S. Army, to the U.S. Senate Select Committee on National Water Resources entitled "Future Needs for Navigation." The criticism covers the report's statement of economic benefits to be derived from the proposed expansions in the nation's waterways; its failure to consider the alterations in capacity possible in a competitive society, errors of forecasting and several other areas which the critique considers mistaken or inaccurate, including justification, cost estimates, benefits expected and statistics used. Inherent waterways limitations are stated to be circuity, speed, seasonality, geographical coverage, and commodity usage. Other limitations are that use of them is incidental to waterside location, that a few large shippers are the principal beneficiaries of waterway improvements, and that water transport costs are understated because waterway improvement costs are not included in the total cost. A major premise of the report, that the railroads could not absorb the annual increase in water traffic is analyzed and considered to be false and other carriers are described as having excess capacity.

The importance to national defense of the waterways system is denigrated through examples of bombing raids on waterways and canals showing them to be highly vulnerable to attack. Waterways are shown by statistical tables to be less economical than railroads and future growth is shown capable of being handled more efficiently and more cheaply by rail. Finally the report is criticized as being not germane to the subject under consideration by the committee. Various communications by interested groups on the subject of water consumption concerning other Committee prints are included, mainly in the form of correspondence.

U-015

U.S. Department of Commerce.
THE EFFECTS OF RESTRICTIVE MUNICIPAL REGULATIONS ON MOTOR CARRIER OPERATIONS AND COSTS. (Project Transim). Prepared by Department of Engineering, University of California. U.S. Department of Commerce, Washington, D.C., 1966.

U-016

U.S. Department of Commerce.
FEDERAL TRANSPORTATION POLICY AND PROGRAM. U.S. Government Printing Office, Wahington, D.C., 1960.

This report, presented by President Eisenhower, identified certain transportation problems and suggested a redefined role of the Federal government as well as administrative and legislative steps to assure a balanced development of our transportation system. The long-range objective of Federal policy should be a reduction in the cost of transport. Less improvement has been made in distribution than in production and the remaining potential for improvement in the nation's economic efficiency lies in the area of distribution of which transportation is the largest single element. A broad plan for the achievement of these objectives should include: adequate capacity, low cost, low rates, customer choice, carrier initiative and health, Federal neutrality user charges, subsidies (reduced and then eliminated), and Federal economic regulation (equitable for all carriers, a factual basis for uniformity of policy). Our present situation is a loose grouping of individual industries: vast networks of highways, railways, inland waterways, airways and airports, pipelines. Little attention has been paid to conflict among these. Economic regulation has been administered in rigid compartments although problems are common to many types. Total capacity is not geared to total need. The best way to achieve these objectives is by fostering and economically balanced transportation system in which each mode of transport carries what it can haul most economically and the entire system keeps adapting to technology and the national economy. Two approaches are possible: Federal regulation with centralized thinking in Washington, or fair competition in price and service to the customers with regulation only where monopoly or the threat of destructive competition remains. The carriers would have greater freedom in setting rates and developing their routes and services. Certain action programs are outlined and the effects on carriers suggested.

U-017

U.S. Department of Commerce. Maritime Administration.
THE ECONOMIC IMPACT OF UNITED STATES OCEAN PORTS. U.S. Department of Commerce, Maritime Administration. U.S. Government Printing Office, Washington, D.C., 1966.

Employment generated by exports, cargo earnings, tonnages and values of cargo, numbers of passengers, numbers of vessels, port development expenditures, are presented in tabular form by state, ports, and congressional districts. The various kinds of information were obtained from various sources, and hence do not all refer to the same time period. (Employment data are for 1960; port traffic figures are for 1962 and port development expenditures for 1946-1962).

U-018

U.S. Dept. of Commerce. Maritime Administration. Office of Program Planning.
UNITED STATES SEAPORTS-ATLANTIC COAST. U.S. Maritime Administration-Port Ser., pt. 1, Aug 1963. 170 pp.

This is the second of a series of three publications containing data of value to commerce and shipping interests. Port administration, federal functions and services, port and terminal rates, services and charges, labor contracts, rules, benefits, wage rates and related data are all included. Foreign and domestic trade, port development and port-related technical studies and research programs, policy and legal actions taken by the Federal government affecting the port industry are also covered.

U-019

U.S. Federal Aviation Administration.
FAA INFORMATION. Office of Information Services, Federal Aviation Administration, Department of Transportation, Washington, D.C.

This is the heading employed for news releases to newspapers and other communication media. The specific issue (67-64, for release August 26, 1967) is an announcement of the fiscal year 1968 federal-aid airport program. The 72 pages contain a summary by state with the number of projects and the federal funds granted. Also included is a breakdown by states and towns giving the amount granted for each project and a description of the work to be done.

U-020

U.S. Federal Aviation Administration.
GENERAL AVIATION STUDY AND FORECAST OF FLEET AND ITS USE IN 1975. Economics Division. Office of Policy Development. Federal Aviation Adminstration, Washington, D.C., 1966.

U-021

U.S. Federal Aviation Administration.
NATIONAL AIRPORT PLAN: FISCAL YEARS 1968-1972. Federal Aviation Administration. Department of Transportation, U.S. Government Printing Office, Washington, D.C., 1967.

A five year plan identifying existing and new airports recommended for development. The National Airport Plan, listing airports, heliports, and seaplane bases which make up the national system of airports, and identifying the communities where new facilities are required, is analyzed. Statistical tables give estimated recommended airport development cost by cost item by state. The principal Federal agencies involved in coordinating airport planning are described, as are National Airport System planning and development criteria. The economic prospects of the aviation industry and air transport to 1975 are presented in graphs. The airport environ-

ment is presented from a historical, socioeconomic point of view, and current problems of aircraft noise, and airport access are discussed. Most of this book is devoted to descriptive airport data, arranged, in tabular form by state. Airports, heliports and seaplane facilities are listed alphabetically within each state. They are analyzed as to site status, kind of airport, congestion reliever, recommended runway length, and recommended development. FAA field office addresses complete this valuable work.

U-022

U.S. Federal Aviation Agency.
ACCESS TO AIRPORTS; SELECTED REFERENCES, 1963-1966. Bibliographic list no. 12. Compiled by L.K. Annus, Federal Aviation Agency, Washington, D.C., 1966.

U-023

U.S. Federal Aviation Agency.
AIRCRAFT NOISE AND SONIC BOOM; SELECTED REFERENCES. Bibliographic list no. 13. Federal Aviation Agency, Washington, D.C., Oct. 1966.

A bibliography of 460 annotated entries with author and corporate source index.

U-024

U.S. Federal Aviation Agency. Flight Information Division
AIRMAN'S INFORMATION MANUAL. U.S. Government Printing Office, Washington, D.C., Dec. 1964.

U-025

U.S. Federal Aviation Agency.
ECONOMIC PLANNING FOR GENERAL AVIATION AIRPORTS. Federal Aviation Agency Planning Series, Item no. 4. Federal Aviation Agency, Washington, D.C., Dec. 1960.

Basic guides useful in designating places for airport location for a balanced airport system are presented. Statistics are given on ownership and location of general aviation aircraft; brief studies are presented on airport planning for air carrier communities and in communities without air carrier service. The conclusions state in part that places with 10,000 population or 10 based aircraft constitute general aviation's best markets for airports; in metropolitan areas, a neighborhood with 10 aircraft owners justifies an airport if no suitable one exists within 10 miles or 30 minutes driving time; and large air transportation centers need separate general aviation airports.

U-026

U.S. Federal Aviation Agency.
FILMS FOR PUBLIC USE. U.S. Federal Aviation Agency, Washington, D.C., January, 1967.

The FAA distributes films, many of which are technical. In their Bulletin "Films for Public Use" of January, 1967 two appeared to be of interest.

It Pays to Stay Open (FA-609) -- This film documents how low-cost lighting of airports, particularly utility-type airports, provides round-the-clock operations and can result in economic benefits to a community. Describes how business leaders of two Massachusetts communities, working with their State Aeronautics Commission and the Federal Aviation Agency, equipped their airports with low-cost runway and approach lighting. 23 minutes. 1966. Color.
The Best Investment We Ever Made (FA-304) --Describes the economic benefits of general aviation airports. Can be used most successfully in describing these benefits to local officials in communities without airports. Color. 23 minutes. 1964.

U-027

U.S. Federal Aviation Agency.
HELIPORT DESIGN GUIDE. Federal Aviation Agency, Washington, D.C., Nov. 1964. AC 150/5390-1.

A comprehensive guide for the development and construction of all types of heliports and for assistance in understanding the need for heliports. A standard source of heliport design criteria, it outlines basic physical, technical, and public interest factors. An overview of the subject as well as the role of government, helicopter characteristics, classes of heliports/helistops, site selection, physical characteristics, elevated heliports, visual aids, safety considerations, and a selective bibliography are included. Appendices include FAA forms, helicopter data charts, and illustrations and diagrams of helicopters and heliports.

U-028

U.S. Federal Aviation Agency.
PLANNING THE AIRPORT INDUSTRIAL PARK. Advisory Circular, no. AC 150/5070-3. Federal Aviation Agency, Washington, D.C., Sept. 30, 1965.

The planning, organizational control and operation of the airport industrial park is discussed, including layouts of selected operating airport industrial parks. Topics include: the organization for development, physical planning, land use controls, management and operations, federal and state assistance.

U-029

U.S. Federal Aviation Agency.
PLANNING THE METROPOLITAN AIRPORT SYSTEM. Advisory Circular no. AC 150/5070-2. Federal Aviation Agency, Washington, D.C., Sept. 1965.

The relationship between airport system planning and comprehensive metropolitan planning is discussed. Metropolitan airport system planning should be part of the comprehensive metropolitan planning program and chechlists of elements to be included in such programs are provided.

U-030

U.S. General Services Administration.
UNITED STATES GOVERNMENT ORGANIZATION MANUAL 1967-68. REVISED JUNE 1, 1967. Office of the Federal Register. National Archives and Records Service. General Services Administration. U.S. Government Printing Office, Washington, D.C., 1967.

The three branches of the government are described in detail and the incumbents and their titles listed. The scope of each agency is indicated together with its history, functions and limitations. There is an index by agency title and subject. The Department of Transportation, with names and titles of officials as of June 1, 1967 is included, together with information on the structure and function of the Civil Aeronautics Board, the Interstate Commerce Commission, the Federal Power Commission, as well as similar agencies. There is also a separate index of names so the person in charge of a specific area can be identified. Telephone numbers are only given for the agency under the name of the unit.

U-031

U.S. Interstate Commerce Commission. Bureau of Accounts.
COST OF TRANSPORTING FREIGHT BY CLASS I AND CLASS II MOTOR COMMON CARRIERS OF GENERAL COMMODITIES BY REGIONS OR TERRITORIES FOR THE YEAR 1965. U.S. Interstate Commerce Commission, Washington, D.C., 1966. (ICC Statement No. 7-66)

U-032

U.S. Interstate Commerce Commission. Bureau of Accounts.
TRANSPORT STATISTICS IN THE UNITED STATES FOR THE YEAR ENDED DECEMBER 31, 1965. PART 6. OIL PIPE LINES. Bureau of Accounts Interstate Commerce Commission, Washington, D.C., 1966.

This volume is the 47th in a series of similar reports and contains a summary of selected financial and operating data from 1961-1965: Pipeline mileage by individual company, by states; various financial data including income items, operating revenues and expenses, capitalization and dividend declarations; number of employees and their occupations; and corporate changes for 1965.

U-033

U.S. Interstate Commerce Commission. Bureau of Economics.
AIR -TRUCK COORDINATION AND COMPETITION. Statement 67-1.
Bureau of Economics. U.S. Interstate Commerce Commission, U.S. Government Printing Office, Washington, D.C., Feb. 1967.

Coordination of different services and modes of transportation is frequently a desirable objective of regulatory policy, as well as national economic policy. One type of coordination likely to be of increasing significance in the future is that between air cargo carriers and motor carriers of freight. This study evaluates the general characteristics of air-truck coordination and problems involved in its development. Despite certain seeming anomalies, public policy not only calls for greater coordination between air and truck lines but also a reasonable degree of competition between these modes. For this reason, the study examines certain aspects of air-truck competition and their significance. Consideration is also given to certain legal, regulatory, operating, technological, and economic factors which may or could deter the development of air-truck coordination. Although qualified by the limited data available, the study assesses prospective developments

in both air-truck coordination and competition.

U-034

U.S. Interstate Commerce Commission. Bureau of Economics.
TRANSPORT ECONOMICS: MONTHLY COMMENTS. Bureau of Economics.
Interstate Commerce Commission, Washington, D.C., 1967.

A monthly statistical report on significant aspects of transportation. Current information on general subjects such as: rail carload way bill statistics; operating revenues by modes of regulated transportation, revenues and expenses, class I line-haul railroads.

U-035

U.S. Waterways Experiment Station, Vicksburg, Miss.
NAVIGATION CONDITIONS AT LOCKS AND DAM NO. 4, MONONGAHELA RIVER PENNSYLVANIA. Technical report. Vicksburg, Mississippi. 1966.

On the Monongahela river there are presently 12 locks and dams which are old and in need of replacement and inadequate for modern tows. Congress authorized improvements including replacing old locks and dams and the construction of others, for the existing and expected traffic on the river. Tests were undertaken to determine whether flows and eddies produced by the improvements would be a danger to traffic; it includes recommendations for construction to correct for potential hindrances.

V-001

Vaughan, Harry.
UNITED STATES TRANSPORT POLICY WON'T BE DECIDED AS SINGLE PACKAGE-BOYD. Nation's Cities, vol. 3, no. 10, Oct. 1965, pp. 24-25.

Alan S. Boyd, who formulated President Johnson's transportation program stated that the ills that beset America's various transportation systems will be attacked one by one. Highway safety is a high-priority item, citing the Baldwin amendment that Congress nearly approved which would have denied federal funds to states not having adequate safety programs. As to rates and mergers, Boyd suggested that the various agencies go their own and often diverse ways. The major problem, he stated, is that we are rapidly becoming a nation of cities and future transportation programs must be geared to meeting these needs and that all modes of transit should be meshed into the best system for each metropolitan area.

V-002

Vernon, R.
METROPOLIS 1985; AN INTERPRETATION OF THE FINDINGS OF THE NEW YORK METROPOLITAN REGION STUDY. Harvard University Press, Cambridge, Mass., 1960.

An interpretation of the principal findings of a series of books dealing with the forces that shape the New York Metropolitan Region. The economic history of the region is discussed, emphasizing the region's advantages and disadvantages for different kinds of business and industry, and the interrelation between the jobs in the region and the people who live in it. Local government problems, the commuting crisis, and rapid transit services are analyzed along with a projection of the metropolis of 1985.

V-003

Virginia Council of Highway Investigation and Research.
FORECASTING AND ESTIMATING; A SELECTED ANNOTATED BIBLIOGRAPHY WITH SPECIAL EMPHASIS ON METHODOLOGY, by Marvin Tummins and William R. Trenor. In cooperation with the U.S. Bureau of Public Roads. Charlottesville, 1961.

V-004

Voorhees, A.M.
AIRPORT ACCESS, CIRCULATION, AND PARKING. ASCE Proceedings, vol. 92. (J. of Aero-Space Transport Division), no. AT1, Jan. 1966, paper 4611, pp. 63-75.

Airport traffic is divided into its various components, such as air travelers, workers, and visitors, to determine from them certain implications for proper airport parking, access, and circulation facilities. It is emphasized that for proper access and circulation, airports should be located on freeway system; direct access should be provided to air terminal, air-freight terminal, and parking areas; truck and auto movements should be separated, and internal transportation should be provided as necessary and separated from other forms of airport traffic.

W-001

Walker, W.J. and J. K. Howell.
TRANSIT EXPRESSWAY MEDIUM-DENSITY MASS TRANSIT SYSTEM.
ASME Paper 65-RR-5, for meeting Apr. 7-8, 1965. 8 pp.

A test installation of a new transit system concept called "Transit Expressway", which is nearing completion in South Park, Allegheny County near Pittsburgh, Pennsylvania is described. The system concept, design philosophy, project objectives, and the features of the vehicle: structural, communication and control, and power-distribution design are explained. The system features rubber-tired vehicles with electric propulsion and automotive-type running gear. The trains, whose consist (number of cars) may be varied to meet changing demand, are assembled by mechanial transfer devices and are operated under precise headway, speed, and acceleration control from wayside.

W-002

Wallace, S.R.
AIR CARGO HANDLING - ASSOCIATED GROUND SUPPORT EQUIPMENT.
SAE-Paper 650207 for meeting Apr. 12-15, 1965. 6 pp.

The ground support equipment for the DC-8F jet freighter was developed by United Air Lines, using analysis of air freight processing on the ground and a study of functional requirements for the handling of pallets. A systems approach for total dock-to-air-to-dock was employed to assure speed and efficiency in handling jet aircraft on the ground. The paper presents statistical findings of air freight characteristics and the development of ground equipment, using "off-the-shelf" component parts, assembled to load and unload 10,000 lb. pallets in less than 1.5 minutes each. The example used was that of O'Hare air-freight terminal in Chicago.

W-003

Wallace, S.R.
JET CARGO FACILITY REQUIREMENTS. ASCE Proceedings, vol. 90, (J. Aero-Space Transport Division), no. AT2, Oct. 1964, paper 4068, pp. 135-140.

It is stressed that the expanding air-freight industry requires that plant facilities be kept ahead of operating demand. It is estimated that air-freight volume in 1970 may be 6 times as much as that carried in 1963. Adequate planning is necessary to allow for orderly expansion.

W-004

Warskow, M.A. and A.E. Tiemann.
CAPACITY OF AIRPORT SYSTEMS IN METROPOLITAN AREAS. ASCE Proceedings, vol. 92, (J. of Aero-Space Transport Division), no. AT1, Jan. 1966, paper 4609, pp. 35-61.

Airports in and around metropolitan areas must be planned and operated as a system. A methodology is presented for evaluating quantitatively the operational factors involved in the development of the airport system. Among the factors considered are: (1) airspace use, including interactions between airports; (2) airport capacity; (3) runway, taxiway, and apron facilities; and (4) helicopter operations. The methodology provides a technique for computing the current and future annual capacity of each airport and of the total airport system, taking account of the limitations caused by any of the operational factors. The computation evaluates the number and time of operating delays over a one year period and selects annual

capacities at a reasonable delay level. Such computations permit a comparison of annual capacity with forecasts or demand to determine the need for improved airport facilities or new airports. Examples of use of the methodology are given as well as an abbreviated technique for screening out alternative airport development plans in terms of capacity. (14 figures)

W-005

Watkins, H.D.
CAB MOOD SPURS ROUTE FILINGS FROM THREE ALL-CARGO CARRIERS. Aviation Week, vol. 86, no. 18, May 1, 1967, pp. 27-28.

Flying Tiger would like to add 12 cities to the 14 now served. Airlift, which operates from Northeastern cities to Europe, and Seaboard World would like to obtain the certificate of Slick Airways which is no longer operating. Flying Tiger would like CAB to hold a route proceeding at which the whole problem of domestic all-cargo system would be considered. Eastern and Northwestern have filed formal statements with CAB contending that Flying Tiger has not shown a need for the additional service it seeks, or the board investigation it proposes.

W-006

Watkins, H.D.
SST PROGRAM RESPONSIBILITY SHIFTS. Aviation Week, vol. 86, no. 19, May 8, 1967, pp. 28-29.

The participation of the Federal government in the construction and flight-testing of two prototype supersonic transports shows a shift in responsibility from government to industry. The Phase 3 contracts, signed May, 1967, charge the two prime contractors (Boeing for the airframe, General Electric for the engines) with the development by July, 1968, with financing plans for Phase 4 certification and Phase 5 initial production stages, with the least possible governmental participation in the additional $2-$2.5 billion needed after Phase 3. The Federal Aviation Administration will primarily monitor the program, doing financial planning, and helping with design problems. A table gives the agency's estimates of the Phase 3 financing.

W-007

Watkins, Harold D.
HUGHES DESIGNING CIVIL, MILITARY HOT CYCLE AIRCRAFT. Aviation Week, vol. 84, Feb. 28, 1966, pp. 48-9, 53, 55.

A description of design research at Hughes Tool Co. to produce a combination helicopter-airplane is presented. The propulsion system and vehicle design are described and performance predictions are given. A mass transit version capable of carrying 50 to 100 passengers at a direct operating cost of $230/hr. is outlined.

W-008

Wattleworth, J.A. and W.R. McCasland.
STUDY TECHNIQUES FOR PLANNING FREEWAY SURVEILLANCE AND CONTROL. In: Freeway Characteristics, Operations and Accidents. Highway Research Record, no. 99. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 200-223.

Four study techniques, found to be useful in planning the peak period freeway surveillance and control activities on the Gulf Freeway in Houston, are presented: entrance ramp origin-destination studies, input-output studies of closed freeway subsystems, aerial photography, and input-output studies of critical intersections in the study area. Data from these studies can be used to plan peak period ramp controls, because demand and capacity can be estimated at each bottleneck; and to plan arterial street controls to provide for diverted traffic.

W-009

Weinberg, Morton I., J. Deleys and R.F. Schneeberger.
SURVEILLANCE METHODS AND WAYS AND MEANS OF COMMUNICATING WITH DRIVERS. National Cooperative Highway Research Program Report 28. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1966.

A method to predict travel time on an urban freeway during a traffic tie-up was studied and the effectiveness of an airborne observer to reroute traffic during a traffic tie up was investigated. The development of a mathematical logic to predict travel time following a breakdown in traffic flow is described. Calculation of the conditions that predict a tie-up and the resulting travel times are preformed in real time on a high-speed digital computer. Data on traffic behavior are transmitted to the computer from volume-occupancy sensors spaced over the lanes of the freeway in a manner consistent with the data-sampling method and the expected mean speed of the cars. The computer is programmed to estimate the time required for the vehicles located at certain sensor stations to pass through the bottleneck. The object is to devise an early warning system to warn motorists to avoid the freeway. Another study evaluated the effectiveness of an airborne observer who communicates by commercial radio to motorists when incidents threaten to tie up traffic. Two crude analysis performed early in the project seemed to show that the cost (about $35,000 per year) could be justified. A cooperative study with nearly 5,800 motorists over a six month period showed that there was economic justification for alerts. The annual saving in delay time was estimated at $48,000 for the vehicles alone. A tethered balloon with a closed-circuit television camera is also described (40 ft. diameter, 400 ft. altitude, $15,000 cost).

W-010

Westinghouse Air Brake Company.
DEMAND, SUPPLY, AND ECONOMIC IMPACT OF TRANSPORT IN THE KEYSTONE CORRIDOR. REPORT TO THE COMMONWEALTH OF PENNSYLVANIA. Pittsburgh, Pa. 1967. 87 pp. (Also: Appendix I, DEMAND ANALYSIS, 85 pp.; Appendix II, ROUTE ANALYSIS, 44 pp.; and Appendix III, SYSTEMS ANALYSIS, 99 pp.; Dec., 1966).

A study of a high-speed, east-west transportation system for Pennsylvania with the following suggested specifications; implemented by 1975, 81 feet wide roadbed with a two-track rail system carrying passengers and freight at 90 and 150 mph. Investment: $947 million for fixed facilities, $231 million for rolling stock. Estimate for 1990: four-track system and duplicate tunnels and bridges; Additional cost: $504 million for fixed facilities and $103 million for rolling stock. Route: in the Pennsylvania Turnpike corridor from the Ohio line near New Castle through Pittsburgh, Harrisburg to Philadelphia. Cost of this system from the Ohio border to Parkesburg: $1.5 billion. It is predicted that the system will carry 36 million tons of freight and 3 million passengers annually earning $170 million over all costs including interest charges and amortization. The median strip is to earn revenues as a route for power lines and telephone lines. Hovercraft and integrated aircraft as possibilities for the future are mentioned. The recommendation of the study is that the Commonwealth should initiate a flexible program to provide high-speed surface transportation linking the Northeast Corridor with the industrial centers of the Midwest. Demand-, route-, and systems analysis, all of which are route oriented, are presented.

W-011

Wetmore, Joseph W.
V/STOL TRANSPORTS AND THEIR TERMINAL REQUIREMENTS. ASCE Proceedings, vol. 92, (J. of the Aero-Space Transport Division), no. AT1, Jan. 1966, paper 4612, pp. 77-93.

Major research and development efforts have resolved many V/STOL problems and are expected to yield still more improvements in efficiency, reliability and handling characteristics to make feasible its use in civil transport. Economic considerations suggest that the primary use of V/STOL aircraft will be in the short-haul market, where their advantages may offset the higher operating costs. To exploit these advantages special terminal facilities will be required. The size, arrangement location and support facilities of these terminals are considered as they are affected by such operational characteristics of the V/STOL as landing performance, noise generation, downwash characteristics and requirements and limitations imposed by all-weather operations.

W-012

Wheatcroft, S.F.
TEN ECONOMIC LESSONS FROM SHORT-HAUL AIRLINE OPERATIONS. J. Royal Aeronautical Society, vol. 65, April 1961, pp. 221-31; DISCUSSION. pp. 231-5.

The author, an economic consultant to Britain's air industry, offers the following lessons: high route density is the key to lower costs and profitable operations; the highest practicable level of operating utilization is economically vital; high route traffic density makes possible high load factors without representing inadequate public service; flexibility in the disposal of payload has an important bearing on the ability of an airline to achieve high load factors; maximum flexibility is essential in airline pricing policy; cross subsidization of unprofitable operations by profitable services is a dangerous policy - commercially and socially; competition is a double-edged sword; specialization on particular kinds of operations brings great economic advantages in the airline industry; various forms of cooperation are becoming increasingly desirable and necessary; short-haul airline managements must always watch costs carefully.

W-013

Whitby, R.H.
AN AIRLINE VIEW. J. Royal Aeronautical Society, vol. 69, no. 659, November 1965, pp. 732-737.

A paper read at a symposium on Cheap Short-Range Air Transport. Cheap and short-range are stated to be a contradiction in terms: U.S. domestic operations in 1964 show that for the average trip of 680 miles there was a 10% margin of revenue over cost but at 200 miles there was a deficit of 30%. British European Airways (with which the author is affiliated) has had almost twenty years experience dealing with short-range operations and therefore has data for study. Total BEA operating costs; airframe prices in 1964; cost indexes; the real effect on operating costs of improvements in aircraft; reduction in operating cost by higher utilization and seating density; reliability and cost, size; turboprop and turbo-jet, are topics discussed. The author concludes that operating costs have halved in real terms during the last decade; direct cost changes have been equally split between increased aircraft efficiency including the effect of size, and putting more seats in a given space together with increased utilization; there are cost operational advantages of large size; there are physical limits to the extent to which more passengers can be got into aircraft; reliability is the most hopeful design feature to improve utilization

and to cut maintenance costs; a wide market has to be found for any new aircraft otherwise high standing charges will prohibit low costs.

W-014

Whittelsey, C.C.
PIPELINES OF THE FUTURE. Oil and Gas Journal, vol. 60, February 19, 1962, pp. 123-4.

Pipelines will carry solids as well as fluids, will act as mixing vats processing materials while they are in transit, and will transport two, three or more materials at the same time. The pipeline will be built of new materials such as aluminum, now used on smaller lines and permitting automatic welding, or plastics, now used in gas-distribution systems and crude-oil gathering lines. Steel and iron will be the major pipe materials, but longer joints will reduce welding costs and exterior and interior coatings will increase lifespan. Also suggested as possibilities are undersea pipelines and rapidly depreciable mechanical equipment.

W-015

Williams, A.C.
A STOCHASTIC TRANSPORTATION PROBLEM. Operations Research, vol. 11, September 1963. pp. 759-70.

Solutions are presented to the transportation problem represented by a single homogeneous commodity from several sources distributed to a number of destinations, where the demand for the commodity at each of the several destinations is a random variable. The analysis is presented in terms of a shipment by a business firm but there are implications for general traffic flow.

W-016

Wohl, Martin.
COSTS OF URBAN TRANSPORT SYSTEMS OF VARYING CAPACITY AND SERVICE. In: Top Issues in Urban Research 1963. Highway Research Record, no. 64. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963, pp. 1-70.

The framework and methodology for costing alternative urban transport systems is defined, and variables most intimately affecting the relative cost structures (e.g. station spacing, transport type, volume levels, schedule frequency, etc.) are identified. The conditions under which lowest costs may be attained are specified by comparing the costs of alternative modes of transport at equivalent passenger volumes and service levels for each. The analysis included hourly passenger volumes ranging from 5,000 to 50,000 and primarily focused on the downtown to-and-from home, rush-hour movement. Rush-hour travel by various types of facilities and volumes during peak hours is considered for variable route lengths. For situations in which a connecting downtown distribution system is not to be provided, express bus operations were found to be preferable in terms of both cost and service, at hourly passenger volumes in excess of 5,000. However, for volumes at or just below 5,000, the private automobile appeared to be preferable. Rail transit systems exhibited substantial cost economics compared to other modes when underground transport is needed.

W-017

Wolfe, Roy I.
CONTRIBUTIONS FROM GEOGRAPHY TO URBAN TRANSPORTATION RESEARCH. In: Urban Transportation: Demand and Coordination. Highway Research Board Bulletin 326. National Research Council. National Academy of Sciences, Washington, D.C., 1962. pp. 46-66.

A brief review with 53 references of the geographic concepts applicable to urban transportation. While these concepts are not, perhaps, unique to geography, the insights that arise from them may be. Among them are: location theory, central place hierarchy, urban functional classification, regional land-use analysis, simulation models, graph theory, and particularly new approaches to cartography, including the use of machines in mapping mathematical maps, and distortions that will clarify the relations between distance, cost, and time.

W-018

Wood, Jr., H.E.
NEW APPROACH-TOLL TRAFFIC ASSIGNMENTS. Traffic Engineering, vol. 35, no. 6, Mar. 1965, pp. 18-19, 48, 52.

The concept underlying development of toll traffic assignment procedure uses toll adjusted time ratios, allows use of a standard time ratio formula, and enables the mechanization required for extensive traffic assignment projects. The development of a toll time ratio formula and an example of toll assignment curve locus derivation are described.

W-019

Work, J.W.
AN ECONOMIC REPLACEMENT MODEL FOR HIGHWAY SURFACE DETERMINATION. In: Highway Economics. Highway Research Record, no. 12. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1963, pp. 124-148.

This paper points out basic inadequacies in the conventional cost approach to highway surface-type determination and presents an economic replacement model, which recognizes the value of funds over time. The former approach relies on a static concept of cost and requires a predetermined estimate of surface life; the latter can make an objective determination of surface life and recognizes all costs associated with the surface structure over its life. The conventional approach does not distinguish between value and cost and does not take into account the element of road user cost. The proposed model computes the present worth of present and future highway construction, maintenance, and road user costs, and stresses economic optimization rather than the conventional considerations. Its application to actual data is shown.

W-020

Wortman, R.H.
MULTIVARIATE ANALYSIS OF VEHICULAR SPEEDS ON FOUR-LANE RURAL HIGHWAYS. In: Traffic Flow Characteristics 1963 and 1964. Highway Research Record, no. 72. Highway Research Board. National Research Council. National Academy of Sciences, Washington, D.C., 1965, pp. 1-18.

For the evaluation of variables, mathematical models were devised for the purpose of predicting mean spot-speeds. These models produced equations which were developed by

use of multiple correlation and linear regression analysis, and factor analysis. The speeds on four-lane rural highways throughout Illinois were studied to obtain data for evaluation of the mathematical models. 38 variables were measured at 83 study sites, to represent conditions at each location. Seven additional sites were sampled to test validity of speed prediction equations developed. Observed mean speeds were compared to estimated velocities obtained by equations.

W-021

Wright, J.M. and S.C. Tignor.
RELATIONSHIP BETWEEN GROSS WEIGHTS AND HORSEPOWERS OR COMMERCIAL VEHICLES OPERATING ON PUBLIC HIGHWAYS.
SAE-Paper 937B for meeting Oct. 19-23, 1964. 8 pp.

This study was carried out to provide data on weight-power ratios of vehicles. This information is necessary in developing analysis of travel time, grade-climbing ability, and accelerating ability of trucks. The data analysis indicates that there is a definite increase in the weight-power ratios of commercial vehicles as the number of axles increases and that there is a trend toward lower weight-power ratios. This is substantiated by average reductions in ratio of 12% from 1949 to 1955 and 28% from 1955 to 1963. The performance requirement of 400 lb/hp is liberal and would affect only a small percentage of total vehicles.

W-022

Wright, P.H.
TRAFFIC, TRAFFIC GENERATORS IN CENTRAL BUSINESS DISTRICT.
Traffic Engineering, vol. 35, no. 6, Mar. 1965, pp. 23-4, 46.

Research undertaken at Georgia Institute of Technology to study fundamental relationships between various types of floor space use within the central business district and the traffic which it attracts is described. The research included studies of Gainesville, Charlotte, Chattanooga, Atlanta, and Pittsburgh. A close correlation was found between traffic and retail, office, service, and public floor space use.

Y-001

Yau, S.S.
SENSITIVITY OF TRAFFIC NETWORK. Franklin Inst.-J.,
vol. 278, no. 6, Dec. 1964, pp. 371-82.

The sensitivity of a traffic network is defined for studies of variation of terminal capacities due to decreases of capacities of individual stations and links. The derivation of technique for designing such traffic networks by using the minimum sum of branch capacities and vertex capacities is described. 16 refs.

Z-001

Zboralski, D.
[COMBATING TRAFFIC NOISE.] DER VERKEHRSLAERM UND SEINE BEKAEMPFUNG. Glasers Annalen, vol. 88, no. 10, Oct. 1964, pp. 341-7.

The problems associated with reducing the noise of transport confined to a permanent way are discussed. The necessity of a uniform system of measurement and a binding noise limit on the international level is emphasized.

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